

EDITORIAL

Buying Economically

JUST because many equipment firms want business and are willing to give maximum service to customers in order to get it, some automotive buyers forget at times that in the long run such service isn't free. Oftimes buyers act as though they had everything to gain and nothing to lose by asking a salesman to run to their plant on the slightest provocation, despite the fact that considerable expense be involved in his coming.

True, the salesman usually is perfectly willing to come and to assist his customer in every way. Moreover, if he is a good salesman, he gives the impression that his service is free. But every business man who stops to think for a moment knows that the price of the product has to cover all the expenses of the manufacturing company.

It is not unknown for a salesman to make 10 or 15 90-mile trips inside of a few months in connection with an account not likely to total over \$3000 gross business for the year. Of course, the hope of greater business in the future, always lies ahead.

Cutting marketing costs is just as important to the buyer as to the seller in the long run.

The seller often finds himself in a difficult position because of the great amount of free service which has come to be a custom in his field. He feels that he must continue to give it because all of his competitors do likewise. But he often reaches a point where it is hard to increase the price to cover the increased costs. The buyer, while he may recognize the cost of service, takes the attitude that he doesn't demand it and that he shouldn't have to pay for it. The seller will reply—to himself—that there is such a thing as an unstated demand.

Drafting Room Practice

DRRAFTING room practice, one of the fundamentals of engineering, is now to have the benefit of national standardization. A Sectional Committee on Drawings and Drafting Room Practice has been appointed by the American Engineering Standards Committee and the American Society of Mechanical Engineers has been appointed sponsor for this Sectional Committee.

The importance of systematization or standardization in this line has been recognized in the past and many large industrial concerns have established their own systems or standards of practice and laid them down in drafting room manuals. However, between the individual systems there is a wide divergence. For instance, no less than twenty-three methods of representing the American Standard screw thread are in vogue. The drafting room manuals issued by

such firms as the General Electric Co., the Reed-Prentice Co., etc., standardize the conventions used on drawings, give the sizes of paper or cloth used, the size and style of lettering and grouping of views, dimensioning, methods of expressing tolerances, instructions for alterations, classifications of drawings, etc. What is needed now is to come to a definite understanding as to the best practice to be recommended as a national standard.

Training Skilled Workers

AT the head of an important automobile engine plant is a man who is recognized as one of the ablest production men in the industry, and who combines with his technical ability a knowledge of and interest in philosophy and psychology equaled by few specialists in those lines. Consequently, his comments, made in a recent personal letter, on the question of training skilled workers are particularly interesting. Here is part of what he says:

"There is unquestionably a vital need for the systematic training of skilled craftsmen and manufacturing executives in the motor car industry. It is my impression that less is being done in this direction in our industry than in any other which has been so long established.

"The problem of training skilled craftsmen is complicated by the fact that, on account of the demand for piece-workers and their high earnings—which are achieved after very little training—there is small inducement for boys of the proper caliber to enter long apprenticeships to skilled trades. This difficulty, plus those of the high degree of specialization and the complexity of modern industry, make the problem of training skilled craftsmen one which will require the application of the best brains in the industry before it is solved.

"Certainly the future training of skilled craftsmen is not going to be accomplished by haphazard methods of apprenticeship. Methods must be highly organized and incentives must be carefully studied and applied."

The statement noted in the last paragraph is the logical conclusion of any serious study of the problem of training skilled workers today. And yet there is no readily available means at present through which the automotive industry is either studying incentives or organizing methods.

A few important production executives who take time to look at the broader, as well as at the immediate aspects of their work, have recognized the need for action and have spoken of it more than once. An informal conference of this "little group of serious thinkers" among production executives might furnish the basis for future activity.

Our Industry Today

Output Rate Now 10 to 15 Per Cent Below Average of Early June—Conditions Generally Good and Optimism Continues Unabated

NEW YORK, July 8—Some slowing up in output and sales of automobiles was observed during the week just past, and in the industry as a whole the rate of production is now from 10 to 15 per cent below the average maintained during the early part of July.

Conditions are, however, still better than normal for this time of year and optimism at the factories is unabated. Those concerns which have closed down to prepare for new models are expecting a big summer business, and in the case of several large producers output has not yet caught up with sales.

The July total of production for the industry, it is expected, will be rather seriously affected by a two weeks' closing down of a leading factory which has up to now been turning out cars at a record-breaking rate.

Truck sales are showing a downward tendency, but they are still running well ahead of last year at this time.

Exports in all automotive lines are continuing at the highest rate in the history of the industry.

Insurance Is Lively Topic

With the seasonal decline under way, the manufacturers are bending their efforts to solve pressing merchandising problems, with the idea of bringing down costs and increasing distribution. The most important of these is insurance, and several plans under consideration are all intended to lower rates, which have been on the upgrade recently and have tended to increase resistance from new car buyers.

The manufacturers are also seeking to win back some of the lucrative replacement parts business which they have been steadily losing to independent makers of these parts. Quicker service and lower prices, it is held, will bring about the end desired.

Dealers were never in better shape, reflecting the sound policies followed since the first of the year by the factories in limiting production to sales, maintaining prices during the peak of the sales season, and withholding the introduction of new models until the peak had passed.

DEMAND FOR DIANA EIGHT

ST. LOUIS, July 8—F. H. Rengers, vice-president and general sales manager of the Diana Motors Co., who has returned from an extensive trip covering most of metropolitan centers, says that the reception being accorded the new Diana Eight-in-Line is most gratifying.

According to a statement given out at the factory, there are 1500 unfilled orders on hand. It is said that the stock of closed bodies has been exhausted, and production has been increased to cope with the demand from both domestic and foreign fields.

Unusual Activities Enliven Stock Market

Sustained Demand in Automotive Products Brings Surprise to Traders

NEW YORK, July 8—The usual mid-summer lethargy of the stock market has been broken during the past week by both new developments and price movements of unusual interest. Prices generally have held firmly at or near recent levels, and while specific movements have been due to specific influences either in the affairs of the corporation or in an industry as a whole, there has been a broad and active market for practically all classes of securities.

A new test came to the market following the Santa Barbara disaster and a run up in call money rates of a week ago, when the suspension was announced of a New York stock exchange brokerage firm. In the motor group the immediate effect was reflected first in a violent decline in Stewart Warner Speedometer, which lost some ten points and in which this firm had a large speculative position.

Loss Regained in Week

During the week all of this loss was regained, and semi-official intimations from Chicago, that the dividend rate will be increased later in the year from the present \$5 to \$6, served to bring not only speculative support but a more substantial class of buying.

Elsewhere in the motor group developments were of a sound and constructive character. Thus preliminary estimates of production in June of 396,000 cars and trucks, compared with 404,300 in May and 421,878 in April, the record month, are a measure of the sustained demand which has surprised even the shrewdest trade leaders.

Announcement of the plan by which General Motors Corp. obtains a controlling interest in the Yellow Cab Manufacturing Co. confirmed reports which have

resulted in an active speculation in the stocks of both companies recently.

A second announcement of wide general interest was that of Mack Trucks, Inc., to increase the capital stock. The announcement was followed by speculative profit-taking sales which were, however, readily absorbed.

The continued strength at advancing prices in Studebaker and Moon Motors was a reflection of the continued large sales for the products of these two corporations. Save for the movement in Stewart Warner, there was little of interest in price changes in the other accessory issues. The rubber stocks were firm, but showed no independent activity.

In the general list some activity and advances occurred in the copper stocks, where the statistical position of the metal market was the underlying factor.

Credit continues abundant and is available at low rates, both for commercial and speculative purposes. This fundamental factor promises to continue its position of ease for some months, and this is responsible largely for the optimistic attitude of the financial community toward business during the remainder of the year.—H. H. S.

England's Duties on Cars Not Retroactive

LONDON, July 2 (by mail)—American importers, or purchasers of automobiles will benefit by the action of Chancellor of the Exchequer Churchill, announced in the House of Commons. The recently reimposed McKenna duties, effective July 1, will not be retroactive, the chancellor declared.

This duty imposes a 33½ per cent import tax on automobiles. The saving will be felt by those who rushed automobiles into England since April 28, when it was announced that the McKenna duties would be reimposed. The chancellor explained that in order to make the levy retroactive it would be necessary to alter the Parliamentary program.

Dodge Buys 2,592 Curtiss Engines at \$80.26 Apiece

DETROIT, July 8—Horace Dodge, one of the directors of Dodge Bros., Inc., has purchased 2592 Curtiss airplane engines from the surplus stock of the air service, at \$80.26 each. The engines have been in storage for months and were intended originally for use in training planes of the OX-5 series of 90-horsepower.

The OX-5 engines have been used successfully in speed boats, and it is understood that Mr. Dodge is interested in the construction of marine engines for speed craft.

EXECUTIVES OF BOTH CONCERNS GIVE VIEWS

NEW YORK, July 7—Completion of the General Motors-Yellow Cab Manufacturing Co. deal will merge the largest automobile and taxicab manufacturing units in the United States. The significance of this merger, as seen and described by the heads of the two concerns, follows:

JOHN HERTZ, president, Yellow Cab Manufacturing Co.: "In association with General Motors, the premier automobile manufacturers of the world, the opportunities for the Yellow Cab Manufacturing Co. will far exceed any it has had in its history."

ALFRED P. SLOAN, JR., president, General Motors Corp.: "The proposed merger will immediately place General Motors in a strong position in the bus business, with the opportunity to enjoy a really unique position in future development in that field. General Motors also believes that its position in the heavy duty truck business will be greatly strengthened by the combined management and the benefits derived from more economical manufacture and distribution."

Yellow Cab Sprang From Livery Unit

NEW YORK, July 7—Originally the name of the Yellow Cab Manufacturing Co., parent organization of all Yellow interests, was the Walden W. Shaw Livery Co., but the name adopted when the concern was incorporated under Maine laws on Aug. 25, 1910, was changed to the present title on June 29, 1920.

This concern was incorporated to manufacture, sell and lease taxicabs, motor cars, automobiles and other transport for passengers and goods, with further powers to engage in any business and to act as a holding company.

Operated Taxicabs at First

The company at first engaged in the business of manufacturing and operating taxicabs and other motor vehicles in Chicago, but in 1919 it ceased operation of taxicabs and confined its activities to the manufacture of taxicabs, automobiles and motor trucks. In the three years ending January, 1925, approximately 20,000 Yellow cabs were produced.

The company now owns the entire capital stock of several subsidiaries. For convenience these are divided here into three sections: manufacturing, sales and finance subsidiaries.

Of the manufacturing subsidiaries the largest is the Yellow Coach Manufacturing Co. of Chicago. This company, manufacturing motor coaches and omnibuses,

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General Motors Announces Plan for Merger with Yellow Cab Co. Truck Division of G. M. Corporation Will Be Trans- ferred in Exchange for Controlling Interest in the Hertz Company; \$16,000,000 Involved.

NEW YORK, July 7—Representatives of the General Motors Corp. and the Yellow Cab Manufacturing Co. of Chicago made public today details of the plan under which, when approved by the Yellow Cab stockholders, the truck division of General Motors will be transferred to the Yellow Cab concern, in exchange for which General Motors will receive controlling interest in the Hertz company.

Alfred P. Sloan, Jr., president of General Motors, announced that the plan calls for a readjustment of the capital structure of the Yellow Cab Manufacturing Co. and the sale to it of all the stock of a new corporation, the Yellow Truck and Coach Manufacturing Co., to which General Motors will transfer the plants and other assets of its truck division.

Capitalization Plan

For this transfer General Motors will receive \$16,000,000, to be used for the acquisition of 800,000 shares of the common stock of the Yellow Truck and Coach Manufacturing Co. Capitalization of the new concern will consist of 150,000 shares of 7 per cent non-voting cumulative preferred stock of \$100 par value, 600,000 shares of Class B stock of \$10 par value, and 800,000 shares of common of \$10 par value.

The plan calls for the retirement of 6000 shares of Class A Yellow Cab Manufacturing Co. stock, valued at \$600,000 par. Holders of the present Class B stock will receive Class B stock in the new Yellow Truck and Coach Co. on a share for share basis, and in addition an extra dividend equal to \$25 per share in the form of the 7 per cent cumulative stock of the new concern.

Dividend Participation Basis

The Class B and common stock of the new company will have the same voting power and will participate, share and share alike, in the net earnings and dividends after payment of cumulative dividends on the preferred; except that for a period of three years, if dividends paid are less than 75 cents per share on the aggregate of 1,400,000 shares of outstanding common and Class B stock then Class B shall have cumulative preferential rights as to dividends up to 75 cents per share.

Following the three-year period, if by reason of the three-year provision the common has not enjoyed cumulative dividends per share equal to dividends declared and paid on Class B, then the common for three more years will have similar preferential rights as to dividends, up to the point where the cumulative dividends received per share on each class of stock has been equal from the date of issuance of the common.

Directors of the new Yellow Truck and Coach Manufacturing Co. will be: Irving B. Babcock, Donaldson Brown, Edward

N. D'Ancona, P. L. Emmerson, Harold E. Foreman, John L. Pratt, Leonard S. Florsheim, F. J. Fisher, Paul H. Geyser, Pierre Du Pont, Robert Lehman, Otto W. Lehman, Charles A. McCulloch, John J. Rascob, John A. Ritchie, A. P. Sloan, Jr., Otto E. Stoll, A. H. Swayne, John R. Thompson and William Wrigley.

John D. Hertz will be president and chairman of the board of directors. Other officers will be: Vice-president in charge of production, John A. Ritchie; vice-president in charge of engineering, Paul H. Geyser; vice-president in charge of finance and accounting, George A. Green; vice-president in charge of sales, Irving B. Babcock; vice-president, P. L. Emmerson, and manager of the truck division, Otto E. Stoll.

Directors Approve Plan

The Boards of Directors of General Motors and Yellow Cab Manufacturing Co. have approved the merger plan, and no opposition to it is expected from the Yellow Cab stockholders. The plan also has the support of the two banking concerns which represent the companies. Mr. Sloan's announcement was accompanied by a similar statement from Mr. Hertz, president of the Yellow Cab Manufacturing Co., and the Lehman Brothers, its bankers.

From the standpoint of the Yellow Cab Manufacturing Co. stockholders Mr. Hertz described the plan as the greatest deal in their history, "assuring to the Yellow company the great advantages of economical purchase in large quantities, of quantity production, intensive sales management, large savings in manufacture and the benefit of the highest technical automotive experience in the world."

Advantages of Plan Described

For a long time, Mr. Hertz said, his company had been preparing "to engage vigorously in the manufacture of trucks and commercial bodies, in addition to its established lines of motor buses, taxicabs and its present products."

Acquisition of the General Motors truck division, he added, would immediately enable the company "to become a leading factor in the truck business," securing to it at once "the excellent facilities and the vast resources connected with the General Motors Corp.,"

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Hertz at Pinnacle of Romantic Career

Former Newsboy Now Dominating Figure in Yellow Cab Manufacturing Co.

CHICAGO, June 8—John Hertz, central figure in the Yellow Cab-General Motors consolidation, is now at the height of a career which has been almost as colorful as the particular type of public hire car that first started him to success. Not so many years ago he was peddling papers in Chicago, the son of immigrant parents "just over" from Austria. Later he was taken into a newspaper office as a copy boy. Like a good many other boys of his type, he learned to box and began to participate in amateur bouts. His boss in the newspaper office was prejudiced against boxing and fired him.

Drove Delivery Wagon

Young Hertz next got a job driving a delivery wagon. But he still hung about the newspaper editorial rooms and began contributing sporting notes to a friendly editor on the old *Chicago Record*. He quit fighting, but retained his fondness for the pastime and eventually bloomed out as a fight manager, with a stable of boxers under his direction.

About this time the automobile was coming into its own, and Hertz saw a future in the selling end of the industry. He secured a place with a retail organization in Chicago and soon developed into a star salesman, his commissions the second year netting him over \$11,000. A year or so later he acquired an interest in an automobile agency and was in business for himself. Dealers even in those days had used car problems, and it was this phase of the business that eventually led Hertz into the taxicab field. In the course of his transactions he found himself with nine second-hand Thomas Flyers for which he could not find buyers. He, therefore, conceived the idea of putting into operation an automobile livery.

Adopts the Yellow Color

This venture was not as successful as he had hoped, but he realized that the idea was sound and soon discovered why his methods were not bringing results. For one thing, he found that the public was reluctant to go to the bother of telephoning for a car and waiting for it to arrive. So instead of holding his cars in waiting in a garage, he sent them cruising in the streets, where the public could hail them. Then he found that it was difficult to distinguish his cars from the thousands of others that used the streets. Thereupon he sent his vehicles to a paintshop, and they emerged a dazzling yellow. He called them Yellow Cabs. They resembled the present-day Yellow Cab, however, in color only, for another discovery made by Hertz early in the game was that he needed a special type of car to meet



John Hertz

the severe conditions of taxi service.

As his business grew in Chicago, Hertz reached out into new fields. He began to build his own cabs and to sell them to others. With the cabs he sold his system of operation, which was recognized as the most efficient and successful in the country. He became the largest manufacturer of taxicabs in the world.

His next big step took him into the bus business. He noticed in Chicago that buses were becoming popular and that, especially in fair weather, they were eating into the receipts of his taxicab business. In order to eliminate this competition and to participate in the profits which he realized were to be derived from the right kind of bus service, he put a line of buses in operation. Here also he discovered that a particular type of vehicle was required to give the best results. The outgrowth of this was the Yellow Coach Manufacturing Co.

Interests Now Are Many

Hertz's interests today are multifarious. He is president of the Yellow Cab Co., which operates his cabs in Chicago; chairman of the Yellow Cab Manufacturing Co., which builds the Yellow Cabs; chairman of the Chicago Motor Coach Co., which operates the Chicago bus lines; chairman of the Yellow Coach Manufacturing Co. and chairman of the Omnibus Corp., which is the holding company of the principal bus lines in New York, Chicago and St. Louis, the New York subsidiary being the Fifth Avenue Coach Co.

In addition to building Yellow Cabs and Yellow Coaches, Hertz also is the manufacturer of the Hertz Six, which was recently put in production. This is a passenger car of conventional type that is used exclusively in connection with the Hertz Driveurself System, now in operation in many cities.

Associated with Hertz in his various
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Mack Issues 75,000 Shares at \$100 Each

Stockholders May Subscribe to One for Each Five Owned July 20

NEW YORK, July 7—Directors of Mack Trucks, Inc., meeting in this city today, voted to issue 75,000 shares of common stock at \$100 a share. Each stockholder on record July 20 will be permitted to subscribe to one share for each five held.

Subscriptions will be payable \$50 a share on Aug. 8, the balance of \$50 on Nov. 9. According to an official statement made public by the company, the issue is in accord with a recent announcement in which it was stipulated that, with continued growth of business, additional plant capacity and working capital would be provided from time to time by giving stockholders the right to take their proportion of new common stock issues at an attractive price.

414,730 Common Outstanding

With the new issue the company will have outstanding 414,730 shares of no par common of a total authorized issue of 500,000 shares. Also there is outstanding approximately \$10,900,800 of 7 per cent first preferred cumulative stock, callable at \$110 a share, and \$5,331,700 of second preferred, callable at \$105 a share.

The Mack company declared a common stock dividend of 100 per cent on May 11, 1920.

In harmony with the Mack policy of owning its own service stations throughout the country, a subsidiary has been organized, known as the Mack Realty Co. It has sold to bankers headed by Hayden, Stone & Co. \$3,000,000 in serial 6 per cent notes, extending from one to 15 years. The Mack Realty Co. also will have \$1,000,000 in capital stock, all of which is held by Mack Trucks, Inc.

Rights Worth \$14 Each

The new subscription rights offered to Mack Trucks stockholders of 20 per cent additional stock at \$100 a share results in rights worth \$14 each, based on the present selling price of \$184 for the common. This is the second subscription privilege which has been granted to stockholders in a year. The last instance was in August, 1924, when shareholders subscribed to 20 per cent additional stock at \$80 a share.

New money will be used on extensive expansions in truck and bus manufacture.

FORD PLANT TO STAY

INDIANAPOLIS, July 8—According to Branch Manager Steinmetz, the Indianapolis Ford branch and assembly plant will continue here until after the fall city election.

No Seasonal Slump in Tire Production

Plants Report Demand Holds Steady Despite Recent Price Reductions

AKRON, July 7—The usual seasonal slackening in the automobile tire industry has been postponed for at least two months as a result of continued good demand for casings and tubes from dealers and motor car manufacturers all over the country. Inquiry for future business has been good, despite three price increases within the last three months.

This is indicated in a survey this week of the leading tire manufacturing companies in the Akron district, where more than 50 per cent of America's total tire production is centered.

Production Maintained

It has long been the custom for the big plants like Goodyear, Firestone, Goodrich and Miller to close down for ten days or two weeks in the latter part of June and first of July, so that inventories might be taken, and also allow shipments to catch up with production. Such a practice has not been followed this year, however, owing to the rush of orders which have been piling up since the beginning of the motoring season. Most rubber companies only gave their employees one day holiday for the Fourth, and the night shifts started in again with full production Sunday night.

A "book" inventory was taken in the factories, so that operations might be continued without interruption. Reports of the semi-annual inventories are expected to show stocks of finished goods at a comparatively low ebb, as so far this year shipments have followed closely factory production, and there has been no occasion for piling up surplus stocks in warehouses.

Large Tire Fabric Supply

The rubber manufacturers have been carrying somewhat larger supplies of tire fabrics on account of the low prices which have prevailed, and the expectation of some buyers that cotton goods would be higher. Smaller stocks of crude rubber than usual are on hand, owing to the high prices and scarcity. Some of the smaller companies which exhausted their supply of cheap rubber have even been forced to buy on a hand to mouth basis.

Predictions are being made that the report of balloon tire production in June will show a total of close to 2,000,000 casings, compared with 1,448,974 reported by the Rubber Association of America in April for 75 per cent of the industry. The industry is beginning to feel the effects of a large demand for balloon tires, required by dealers for replacements, in addition to the increasing original equipment needs of automobile manufacturers.

The last association report shows a

production of 1,163,277 balloon tires in March. A little more than one-tenth of this number, 141,272, were manufactured in the same month of 1924. Increased output of balloon tires has resulted in a reduction in the manufacture of small size, high pressure pneumatic tires, although bus and truck cord tires, cushions and solids are being produced in larger quantities.

SALES NOT AFFECTED BY PACIFIC QUAKE

NEW YORK, July 8—No seriously adverse effect on automotive sales in the Far West is expected to result from the Santa Barbara earthquake. Late advices to the Chamber of Commerce of the United States, through its Pacific Coast representatives, show that Santa Barbara was the only community affected and that the major damage was confined to about 1 per cent of the city's business district. A tentative estimate by engineers of the cost of rebuilding the destroyed buildings and making them of modern construction was \$10,000,000, and California financial institutions have agreed to loan the needed funds for rebuilding.

Durant Announces Price Cuts on All Models

LANSING, July 6—Reductions in the list prices of all Durant models, effective July 1, have been announced by the Durant Motors, Inc., as follows:

Model	Old Price	New Price
Chassis	\$ 720	\$ 710
Touring	830	810
Special touring	950	930
Coupe	1,090	1,060
Special coupe	1,235	1,160
Sedan	1,190	1,150
Special sedan	1,310	1,280

OLDS SALES INCREASING

DETROIT, July 6—June sales of Oldsmobiles were larger than for any previous month of 1925 and greatly exceeded the monthly average for 1924. The increase is in keeping with the steady increase shown since the first of the year. The June sales, according to D. S. Eddins were 31 per cent greater than the best previous month for 1925 and 52 per cent better than the average month's business for 1924.

KISSEL REDUCES PRICES

HARTFORD, WIS., July 8—The Kissel Motor Car Co. has reduced prices on its five-passenger, six-cylinder brougham from \$1,895 to \$1,795, and on the eight-cylinder, four-door brougham sedan from \$2,550 to \$2,395.

All four-door models of the Kissel line now have doors 30 in. wide.

Sees Danger in New Down Payment Plan

Hare & Chase, Inc., Sounds Warning Against Sales on Small Basis

NEW YORK, July 8—Seeing a "trend toward unsound financing" in the current automotive situation, Hare & Chase, Inc., automobile finance company, in a statement warns the dealer that he is facing a new and very serious merchandising issue. The company refers particularly to a "finance plan recently announced for a well-known car permitting down payments ranging from less than \$15 upward." In a city in which this plan was tried there was an immediate unfavorable reaction on the used car market, it is declared.

"The plan in question requires two indorsers," says the company, "which the average buyer of limited means cannot command—but the effect of its announcement was to turn the minds of all prospective buyers of those cars, however limited their resources, toward the brand new article and completely away from that which had already seen service in other people's hands. At a saving big enough they could be re-interested in a used car—but not at the prices which had formerly prevailed."

The statement continues:

Says Increase Slow

The automobile man may as well convince himself, before false reasoning leads him into costly mistakes, that the proportion of our population which can afford both to buy and operate a motor car of current design in any price class will only increase very slowly over the present figure. The total number of users should increase as the population grows, but their percentage is unlikely to gain until the average margin between living costs and incomes becomes appreciably wider.

Which being so, it is obvious that the process of teasing the public with easier terms will only rearrange the present market without enlarging it. Let the low down-payment mania become general and the used car carry-over from the active season would sink the average dealer before he could unload it on a public thus thoroughly under the influence of the new car ownership complex. For when you tell the buyer he can have a new car for a cash outlay equivalent to the cost of two theater tickets, or a suit of clothes, you automatically close his mind to the used car appeal.

Once you sell the market off the used car idea your total sales, both new and used, may actually decrease. For if the logical used car buyer feels the new car urge too fiercely, he may conclude not to buy at all until he can meet the new car terms, either by getting the needful indorsers, or by saving a higher percentage of cash.

And if the indorsement requirement is waived—as it will be by the weaker finance companies here and there—he will buy his new car for a pittance in cash and the used car will sit in the same old spot on the dealer's floor until it rots, for all the public cares.

Chrysler Will Back New Insurance Plan

Opposition of Brokers and Agents
Brings Statement from Car
Manufacturer

NEW YORK, July 8—The Chrysler Motor Corp. is prepared to back to the limit its new plan for marketing cars with fire and theft insurance for a year included in the list price. This is the word of Walter P. Chrysler, who sees in the plan an important reduction in costs to the automobile buyer.

Mr. Chrysler's statement was prompted by reports that local insurance interests in some States were endeavoring to upset the arrangements made by the automobile company.

The Chrysler plan was the occasion of a hearing before the New York State Superintendent of Insurance, James A. Beha, today. Some of the details of the plan were gone over by representatives of the various interests concerned, but no action was taken and the meeting was adjourned.

"The public must be protected from excessive rates," said Mr. Chrysler yesterday. "At the factory we watch the expenditure of every cent. Keen competition necessitates that cars be placed in the hands of the ultimate users at the lowest possible price. Why then shouldn't we be equally diligent in saving the purchaser everything we can?"

"We believe financing charges and insurance rates have been too high and so we determined to reduce financing charges and to market our cars fully covered by fire and theft insurance. Before reaching this decision we satisfied ourselves of the absolute legal and economic soundness of our plans.

"Some opposition to the plan has come from a few insurance agents and State insurance commissioners of several States are looking into the details of our plan. In view of the new and unique features of this plan nothing less was to be expected."

Insurance agents and brokers are particularly affected by the Chrysler plan, which eliminates their share of the business as ordinarily conducted.

NEW CHEVROLET BRANCHES

DETROIT, July 6—Two more zone offices, one at Indianapolis and the other at Jacksonville, Fla., have been opened by the Chevrolet sales organization, making a total of 26 zone offices that are maintained throughout the United States.

Charles R. Lee will have charge of the Indianapolis office assuming the responsibilities previously spread between the three zone offices in adjoining states. No stock will be carried.

The Jacksonville office will serve as the distribution center for Florida and southern Georgia, in charge of Chester A. Smith. Plans are being drawn for a two-story building.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, July 8—The usual summer quietness in business activity was emphasized last week by the slowing up of operations in many industrial lines for the mid-year inventories. Trade in seasonal goods is large, especially at retail. Stock prices were noticeably firmer last week, with the passing of the temporary advance in money rates.

Transactions on the New York Stock Exchange in the first six months of this year reached a new high record, amounting to 204,907,139 shares as against 175,798,433 shares in the corresponding period of 1901, the previous record.

The official July forecast of the cotton crop, based on condition June 25, estimates a total yield of 14,339,000 bales, the third largest in the country's history. The total acreage is placed at 46,448,000, which compares with 42,641,000 last year. The condition of the crop on June 25 was 75.9 per cent of normal, comparing with a ten-year average of 74.6 per cent.

Prices of crude rubber advanced on Monday of this week to new high levels for the present movement, standard grades being quoted at 78 to 89 cents a pound.

Production of pig iron last month amounted to 2,666,160 tons, as against 2,930,807 in May and 2,026,221 in June last year. The average daily output was 88,872 tons, comparing with 94,542 in the preceding month and 67,541 a year earlier.

Car loadings in the week ended June 20 numbered 982,600, as compared with 987,196 in the preceding week and 903,546 in the corresponding period a year ago.

Production of crude petroleum in the week ended June 27 registered another sharp decline, the daily average being 2,173,850 barrels, as against 2,197,450 in the week before and 1,975,850 a year earlier. The principal factor in the decline was the reduced flow of heavy oil in the Smackover field of Arkansas. Domestic consumption of gasoline in May was the highest ever recorded, amounting to 832,000,000 gallons, and exceeding by 1 per cent the previous record established in April.

Business failures reported to Bradstreet's for the first half of 1925 numbered 10,344, as compared with 10,495 in the corresponding period last year and 9,916 two years ago.

Fisher's index of wholesale commodity prices stood at 158.9 last week, comparing with 159.5 in the preceding week and 158 two weeks earlier. Dun's monthly index reflected an advance of 0.4 per cent, and Bradstreet's an advance of 1.7 per cent during June.

Earning assets of the Federal Reserve banks increased \$92,600,000 during the week ended July 1, with gains of \$56,200,000 in discounts, \$7,400,000 in open market purchases and \$29,000,000 in Government securities. Note circulation increased \$18,800,000 and total deposits \$42,000,000, while total reserves decreased \$31,900,000. The reserve ratio declined from 77.0 to 74.9 per cent.

During the week ended June 24 loans of reporting member banks increased \$4,000,000 and borrowings from Federal Reserve banks \$3,000,000.

New Paige Sedan on Market at \$2,395 List

De Luxe Five-passenger Model Is
Lowest Priced Car Ever Built
on Same Chassis

DETROIT, July 8—The Paige Motor Car Co. today announced a new de luxe five-passenger sedan listing at \$2,395, the lowest priced model ever mounted on the Paige 131-in. chassis.

Lockheed hydraulic four-wheel brakes are standard equipment on all Paiges without extra charge. An air cleaner is now adjusted on the carburetor intake, and a new counterbalanced crankshaft, weighing 105 lb., adds appreciably to the smoothness of the motor. The principal distinguishing features of the new sedan, which is 109 in. over all, are the D-shaped windows at the rear, with landau braces, four doors, each 28½ in. wide, and an enameled metal trunk mounted at the rear.

Exterior finish is in Cobalt blue having straw colored striping with the belt moulding and upper body section in black. Gold backed mohair upholstery covers the seats and serves also for the head lining. The front seat, which is 46½ in. wide, and rear, which is 47½ in. wide, each have a depth of 19½ in. Built-in arm rests add to the comfort of passengers in the rear. White silken ropes at the rear doors facilitate entrance and exit.

Between the front and rear seats there is a clearance of 21½ in., giving ample tonneau room. A windshield, a one-piece metal sun visor, cowl ventilator and a complete set of shock absorbers are standard equipment. Five 33 by 6.75 balloon tires also are included. Other equipment consists of an automatic windshield cleaner, rear view mirror, motometer, flush type heater, transmission lock and stop light. The dash equipment includes an electrically wound clock and a gasoline gage.

EATON AXLE CO. SETS RECORD

NEW YORK, July 8—June was a peak month for the Eaton Axle & Spring Co., which shipped a total of \$939,203, compared with \$888,491 for the best month in its history, April, 1924. Shipments for the best previous month this year amounted to \$837,846. The July schedule calls for \$902,000, against \$521,000 for July, 1924, and \$654,274 for the best previous July.

N. Y., N. H. & H. SEEKS BUS LINE

BOSTON, July 8—Permission to operate seven bus line routes to Massachusetts was sought today by the New York, New Haven & Hartford Railroad Co., in papers filed with the Department of Public Utilities. Trustees of the Eastern Massachusetts Street Railway Co. entered objections.

Chrysler Balance for June Shows Advance

Total Assets Are \$71,423,179
Against \$65,442,814 for
December of 1924

NEW YORK, July 9—The consolidated balance sheet of the Chrysler Corp. and subsidiaries as of June 25, 1925, shows total assets of \$71,423,179, against \$65,442,814 for the old Maxwell Motor Corp. and subsidiaries on Dec. 31, 1924.

Major items on the asset side are plant and equipment, \$15,716,338, a reduction of \$200,000; good will, \$25,000,000, unchanged; cash, \$8,163,186, against \$5,680,611; acceptance and deposit certificates, \$7,311,007, against \$481,191; inventories, less reserves, \$10,055,842, against \$11,398,161. On the liability side profit and loss surplus showed a big gain, standing at \$6,070,667, as compared with \$6,782, while accounts payable declined to \$3,262,264 from \$5,244,642.

Total current assets as of June 25 were \$25,654,324, and total current liabilities \$4,375,775, leaving net working capital of \$25,278,549. As of Dec. 31, current assets were \$23,029,398, and current liabilities \$6,763,494, leaving net working capital of \$16,265,904.

Yellow Cab Descendant of Livery Operating Firm

(Continued from page 71)

has capital stock of \$1,500,000. Its officers are: J. A. Ritchie, president; C. A. Green, vice-president, and Irving B. Babcock, secretary and treasurer.

The Yellow Cab Manufacturing Co.'s other domestic manufacturing subsidiary is the Yellow Sleeve-Valve Engine Works, Inc., of East Moline, Ill., incorporated to manufacture Knight engines for use in motor coaches and omnibuses.

Foreign manufacturing subsidiaries include the Canadian Yellow Cab Manufacturing Co., Ltd., whose body works, Carriage Factories, Ltd., is located at Orillia, Ont.

The Yellow Cab Manufacturing Co. of England, Ltd., is another foreign manufacturing subsidiary, and this list is completed by the Societe Francaise des Automobiles Yellow, Paris; the Sociedad Sud-Americana de Discuentos de la Compania Manufactura de Taximetros a Marillos, Buenos Aires, and the Sociedad Sud-Americana de Ventos de Taximetros a Marillos, also of Buenos Aires.

Sales Subsidiaries

Sales subsidiaries include the Yellow Manufacturing Sales Corp., the New York Yellow Cab Sales Co., the New Jersey Yellow Cab Sales Co., Newark, N. J.; the New England Yellow Cab Sales Co., Boston, and the Pacific Coast Yellow Cab Sales Co., San Francisco.

ESTIMATE JUNE OUTPUT AT CLOSE TO 400,000

DETROIT, July 8—The usual monthly estimate of domestic car and truck production by the National Automobile Chamber of Commerce is delayed because of the fact that the board of directors meeting, for which the figures are prepared, will not be held until late in the month.

Unofficial estimates, however, bear out the prediction made a week ago in AUTOMOTIVE INDUSTRIES that the figure for June will not be far below the 400,000 mark. It will probably be between 366,000 and 399,000, as compared with 404,300 in May and 421,878 in April of this year, and 249,868 in June, 1924.

The finance subsidiary is the Yellow Manufacturing Acceptance Corp.

The Omnibus Corp. is the principal outlet for the products of the Yellow Coach Manufacturing Co., and Yellow Cab operating companies have been established in Chicago, New York and San Francisco, among other American cities, and Melbourne, Tokio, Chinese cities, London, Paris, Madrid, Copenhagen and Lisbon.

In many cases officers of these companies are identical.

Stutz Gain Seen for Third Quarter

INDIANAPOLIS, July 7—Frederick E. Moskovics, president of the Stutz Motor Car Co. of America, Inc., reports that April, May and June were marked by many constructive developments in both production and merchandising of Stutz cars.

June showed a production increase of 20 per cent over May, an increase in sales of 34 per cent and an increase of distribution connections of 30 per cent over the preceding year.

Indications for July, August and September, Mr. Moskovics says, forecast an even greater increase in production and sales. On July 1 the factory had definite production schedules ahead, based on actual sales, which indicate an increase for the coming months.

Mr. Moskovics adds that the policy for the future would be to build solidly and conservatively upon the foundation of maintaining and adding to the reputation of the company in the past. New dealer and distributor connections are being added only as such connections can be established upon a profitable basis for the dealer.

"The future of this company depends upon two factors," says Mr. Moskovics, "satisfaction of the Stutz owner in his purchase, and the permanent success of Stutz dealers. Any established increase in Stutz production must be dependent upon these two factors."

Rubber Conservation Is Forced by Crisis

National Committee Delays Spring Dating Orders and Sounds Warning to Industry

NEW YORK, July 9—Facing one of the most acute situations in the history of the industry, the executive rubber committee of the Rubber Association of America met in special session here today and approved the broad, general program of conservation suggested by the directors at Akron on June 11.

Immediate postponement of spring dating orders was one of the measures adopted. A general reduction of rubber in types and sizes, together with the strictest economy in all forms of production, was recommended by the committee after an all day meeting.

A. L. Viles, secretary of the association, announced that a special committee is to be appointed without delay, to make more specific recommendations to the industry and to devise specific methods by which the suggestions of the directors may be realized.

There was general trading at 97 cents yesterday, but unconfirmed reports stated that sales of spot smoked sheets at 98 cents made the highest quotation since early in 1916. This was an advance of 5 cents over Tuesday's price.

Skyrocketing of the crude rubber market is believed to have caused the Rubber Association to call the conference here today, in the hope of determining immediate methods of relief for American consumers.

Reduction in types and sizes of tires, abandonment of interchangeable balloon tires, elimination of second quality lines, postponement of spring dating orders and a more extensive use of reclaimed rubber are among steps under discussion.

All of these measures were favored when directors of the Rubber Association met in Akron on June 17, when crude rubber was quoted at 72 cents a pound. Since the spring of 1924, when it was around 20 cents a pound, crude rubber has advanced approximately 500 per cent.

Service Convention and Equipment Show to Continue

NEW YORK, July 8—The National Automotive Service Convention and Automotive Maintenance Equipment Show will be continued next year, according to present plans of the National Automobile Chamber of Commerce. In this connection the current issue of the Service Bulletin issued by the chamber says:

"Putting on the first National Automotive Service Convention and Automotive Maintenance Equipment Show in Detroit last year was an experiment, but its results were so satisfactory that it was decided to repeat them at the same place, the General Motors Building in Detroit May 20 to 23."

Steel Producers Hold Prices in Firm Grip

To Test Issue Between Buyers
and Sellers, But New Dead-
lock Is Imminent

NEW YORK, July 8—A somewhat changed atmosphere pervades the steel market. Producers seem determined that not only must there be no further crumbling away of prices, but that some of the rolled products, such as cold-rolled strip steel, which have sagged more than others, must be lifted back to the levels which were in vogue before the market gave way.

So far there has been no real test between buyers and sellers, and it remains to be seen whether a deadlock will result or whether one or the other will yield. There are reports that some of the larger producers have turned down business offered them at prices that have been more or less general.

It is impossible to verify such rumors, but there is no question that the larger producers are striving to stiffen the price situation all around. Conditions appear to be somewhat in their favor. While all the talk about consumers running low in their stocks is merely conjecture, the fact is that non-integrated rollers and finishers of steel have been inquiring for material, and the larger producers of semi-finished steel can exert considerable pressure on prices for finished products by their control of the semi-finished steel supply.

Producers are Optimistic

Then again midsummer operating schedules have been so adjusted that mills can get along with a lighter backlog of orders. Certain it is that steel producers are more unanimous in the view that the market's low for the year has been reached than they were a month ago. The ensuing fortnight should bring into the open the reaction of consumers to this attitude.

Out and out advances seem unlikely unless the entirely unexpected should happen, but a hardening of prices on the basis of what is now considered the outside of the price range is possible. Pending the clearing up of this situation, there must be noted a much easier tone in automotive alloy steels, competition for new business in this specialty being particularly keen.

Pig Iron—Firm conditions in the pig iron market are accompanied by inactivity. Automotive foundries are virtually out of the market.

Aluminum—Routine conditions prevail both in the matter of imports as well as the domestic product situation. Wall Street reports of a mysterious decline in the market price of the sole domestic producer's stock aroused considerable interest in the trade, largely because it was the first information that there is a growing list of "unwelcome" outside

stockholders who insist upon having information which the company has never made public.

This may be the opening wedge by which automotive consumers of aluminum will be afforded somewhat more insight into the condition of the domestic industry than has been the case heretofore. Aluminum prices, for a year or more, have been on an even keel and highly profitable, so that the decline in the stock value of the domestic company is not to be attributed to adverse market conditions.

Copper—Reports of the dwindling of copper stocks to the lowest tonnage in some time have imparted further strength to the market. Fifteen cent copper is again freely predicted.

Tin—Statistics of the world's visible supply favor the market, which, however, rules rather quiet in the absence of much buying for American consumers' account.

Lead—Storage battery makers are buying more freely since lead has once more receded to rational levels.

Urges Time-Credit on "Healthy Basis"

SANDUSKY, OHIO, July 8—When the Ohio Council of the National Automobile Dealers' Association assembles here for its first annual convention, Aug. 6 and 7, the subject of time-payment credit terms will receive much attention.

C. C. Hanch of Chicago, general manager of the National Association of Finance Companies, who will be one of the convention speakers, will sound a warning note against the tendency to lower credit terms in the sale of automobiles.

"Such movements usually have parallels," said Mr. Hanch. "Intensive competition in the milling machine business led to the institution of too liberal credits forty years ago and was the primary cause of the later demoralization of that industry."

"Our association of industrial bankers, who are financing probably 80 per cent of all the automobile time-payment sales in the country, in laying down its policy demanding a third down on the purchase price and completion of the transaction within twelve months, took the steps we believed necessary for a healthy and permanent business development."

Mr. Hanch will go into the credit situation before the convention with the object of establishing what he says is a "safe and sane" sales plan.

DE PALMA WINS AT SALEM

SALEM, N. H., July 6—Ralph De Palma won the 100 mile race here on the Fourth from a field of 11 starters at the opening of the new Rockingham Park speedway. More than 50,000 spectators attended the event on the 1 1/4 mile track. De Palma, holding the lead from the start, completed the distance in 1 hr. 18 min. and 7 sec. Duray was second and Shafer third.

France Competing Against U. S. Models

G. Baehr, Chrysler Distributor in
France, Says Countrymen
Have Big Advantage

DETROIT, July 6—American automobile manufacturers who can turn out a passenger car that possesses speed with the latest design and four-wheel brakes and that can stand the import duty on their products are assured of good business in France for some time.

That is the message brought to this country by Gustave Baehr, Director General of the Garage St. Didier of Paris and the Chrysler distributor for France. M. Baehr was a recent visitor at the Chrysler factory.

France is going ahead with its own cars, M. Baehr said, and is turning out models that offer strong competition to the American-made car in France.

"There should be good European sales for some time," he said, "although American cars are meeting stronger competition. This will be increased as European manufacturers increase their output, enabling them to lower the cost. With the exception of England and Italy, competition in the other countries is not so keen and American automobile manufacturers stand a much better chance."

"The trend is toward closed cars, especially in the northern European countries. In France the sporting type of car makes a strong appeal, and, of course, to enjoy large sales it must possess speed, four-wheel brakes and good lines."

Other Chrysler distributors, Sydney Clough of Johannesburg, South Africa, managing director of Sydney Clough & Co., Ltd., and Desmond Todd, in charge of the Wellington, New Zealand, branch of the Chrysler Corp., and his brother, Andrew Todd, in charge of the Chrysler Corp. branch at Dunedin, New Zealand, are optimistic regarding the automobile business in their respective countries.

\$25,278,549 Working Fund for Chrysler

NEW YORK, July 6—Current assets of \$29,654,324, with liabilities of \$4,375,775, leaving net working capital of \$25,278,549, were presented in the consolidated opening balance sheet of Chrysler Corp. and subsidiaries as of June 25, 1925.

Cash on hand amounted to \$8,163,186, and good will was fixed at \$25,000,000, with total assets valued at \$71,423,179. Land, buildings, machinery and equipment, less depreciation, were valued at \$15,716,338.

It was stated that in the preparation of this balance sheet no provision had been made for accrued 1925 Federal income tax.

Men of the Industry and What They Are Doing

Chapin Back from Brussels

Roy D. Chapin, vice-president of the National Automobile Chamber of Commerce, has returned from the International Chamber of Commerce Congress at Brussels. His address pointed out that in no time in history has individual transportation been so readily available for the private citizen as it is today. In 1914 the automobile in Europe was exclusively the vehicle of the very wealthy, and while that remains true to some extent today, yet more and more motor transportation is becoming available to those of limited means.

Name Parts Committee

B. G. Koether, General Motors advisory staff, has been made chairman of the N. A. C. C. committee which is to make a survey of the replacement parts situation. Other members of the committee are E. V. Rickenbacker, Rickenbacker Motor Car Co.; M. L. Pulcher, Federal Motor Truck Co.; H. P. Doolittle, International Harvester Co.; Harry B. Moock, Hudson Motor Car Co., and W. M. Warner, Cadillac Motor aCr Co.

N. C. Ford Promotions

L. H. Diehl has been promoted to the newly created position of chief roadman at the Charlotte, N. C., branch of the Ford Motor Co. F. M. Wright, truck sales representative; T. Hanock, trust department representative; A. J. Bech, truck sales representative; H. G. Thrasher, service department representative; J. D. Perry, truck department representative, have all been appointed zone supervisors.

French Airman Is Visitor

M. Felix Saintin of Saintin & Co., Paris, inventor of the Saintin starter for airplanes now in use by the French naval service, sailed from New York on July 6, after a thorough study of aircraft situation in the United States. While in this country M. Saintin was the guest of James E. Diamond of New York. He visited several of the large plants where aircraft engines are manufactured.

Singh Assigned to India

Dr. Nand Singh, for six years connected with Marquette University of Milwaukee as professor in the colleges of business administration, engineering and liberal arts, leaves shortly for his former home in India to take up his new work as field developer of dairying in that country for the Ford Motor Co. The position is a new one created in an effort to build up a new outlet for tractors.

Hollowell Gets Boston Post

D. H. Hollowell, former factory eastern sales manager of the Auburn Auto-

mobile Co., has been appointed general manager of the recently organized Auburn Boston Co. factory branch for the New England States. G. C. Lyons and W. J. Lyman will manage the wholesale department. Joseph Campbell will direct retail sales.

Wills Joins Eisemann Staff

E. V. Wills, former assistant service manager of the Westinghouse automotive division and more recently connected with Barter-Oppenheim, Newark, is now on the Chicago office staff of the Eisemann Magneto Corp. He will act as service traveler in the middle western States.

Name Durant Engineers

Colin Campbell, vice-president of the Durant Motors Corp., announces the appointments of Carl Neracher as chief engineer and Leo H. Robinson as assistant chief engineer of the Durant-Star division, with headquarters at Elizabeth, N. J.

Schubert Named Manager

Frank R. Schubert has been appointed general manager of the Strom Ball Bear-

ing Manufacturing Co. John Dlesk succeeds him as works manager, and Lorenz Peterson continues as assistant works manager in charge of production.

Neun Heads Canadian Branch

J. W. Neun has been placed in charge of the North East Electric Co. of Canada, Ltd., a newly organized manufacturing branch. He was formerly manager of the Toronto branch.

Shaw on Coast Trip

W. N. Shaw, president of the Eisemann Magneto Corp., is making an extended tour of the West and the Pacific Coast. Before returning he will stop for a brief vacation in the Canadian Rockies.

Lowrey Takes Texas House

J. E. Lowrey has been placed in charge of the San Antonio, Tex., supply distributing house recently opened by the Western Electric Co., Inc.

Wollner Succeeds Scheuer

S. Wollner, Jr., has been elected president of the Kelly-Springfield Tire Co., succeeding A. L. Scheuer.

John Hertz at Pinnacle of His Romantic Career

(Continued from page 72)

enterprises for many years have been a group of well-known Chicago capitalists, including William Wrigley, Jr., of chewing gum fame; John R. Thompson, the chain restaurant man; Albert Lasker, advertising man, manufacturer and former head of the United States Shipping Board under President Harding, and Charles A. McCulloch, head of the Parmelee Transfer Co. of Chicago.

MORE RECLAIMED RUBBER

AKRON, July 7—C. E. Bishop, vice-president and factory manager of the Akron Rubber Reclaiming Co., which started operations in Barberton this month, announces that the output is now approximately ten tons of reclaimed rubber a day. Practically all of the company's product is taken by Akron factories. Most of the directors of the company are executives of leading Akron tire companies. B. O. Etling is president.

MACKINNON BANKRUPT

MILWAUKEE, July 7—The F. A. MacKinnon Manufacturing Co. of Wisconsin Rapids, maker of automobile bodies, has filed a voluntary petition in bankruptcy, listing liabilities of \$91,000 and assets of \$26,000.

Report Fewer Deaths in Traffic Accidents

NEW YORK, July 7—Preliminary figures indicate that the motor fatalities for the first five months of the year will be somewhat under the totals for a year ago. This is not the case in the largest cities, according to an announcement from the National Automobile Chamber of Commerce, where the increase was 4 per cent.

Fatal accidents to children were 33 per cent of the accidents where the records were classified. The outstanding need, according to the Chamber, is for more playgrounds, better organized, and rapid strides are being made along these lines. It is reported by the Playground and Recreation Association of America that 231 cities opened 635 new play areas during 1924.

It is pointed out that special attention should be paid to this effort, as the figures for the year indicate that progress in safety is less rapid in the cities over 100,000 than for the country as a whole. The reduction in the entire country is accounted for, in the belief of the Chamber, by the engineering skill and administrative effort which is apparent in the work of State highway departments and motor vehicle authorities. Big cities have an acute problem in congestion, but they are meeting it in New York, Philadelphia, Detroit and Los Angeles.

Yellow Cab Will Be General Motors Unit

Stock Transfer to Combine All Truck Activities Under Same Management

(Continued from page 71)

result which otherwise could not possibly have been accomplished without many years of effort."

Mr. Sloan, after describing the merger plan, added that "the Yellow Cab Manufacturing Co., apart from its position in the taxicab business, occupies a strong position in the bus field. A merger of the General Motors truck business with the business of that company is calculated to result in material economies in the manufacturing and distribution ends of both these important lines of business."

Yellow Cab Financial Statement

General Motors already manufactures Cadillac, Buick, Oakland, Oldsmobile and Chevrolet cars and G. M. C. trucks. The Yellow Cab Manufacturing Co. controls the Yellow Coach Manufacturing Co., the Yellow Cab Manufacturing Co. of England, Ltd., and seven other subsidiaries, including the Drivurself system, which the merger is understood to include.

Net earnings of the Yellow Cab Manufacturing Co. for 1924 were \$2,742,408 after taxes and all charges, including \$869,543 for experimental development. This was equivalent to \$4.49 per share on the 600,000 shares of Class B stock.

Net profits were below dividends paid during the year, because a quarter of the earnings was expended in experimental work, and also because of some decline in earnings. Last December the annual dividend was reduced from \$5 to \$2.52 per share, but since this deduction did not take effect this year there was a 1924 deficit of \$180,842. This, with an income tax adjustment, was made up from surplus which accordingly declined \$203,261 to \$4,304,081.

G. M. Officials Plan European Field Survey

NEW YORK, July 8—Alfred P. Sloan, Jr., president of the General Motors Corp., said in a statement issued yesterday that a group of officers and executives will go abroad in the near future to study European financial and economic developments with reference to the exporting of American cars.

According to present plans the group will include: Fred J. Fisher, Charles Fisher, J. J. Raskob, John L. Pratt, Charles S. Mott, Alfred H. Swayne and James Mooney. While abroad these men will make an inspection trip of the corporation's subsidiary companies and assembly plants in London, Copenhagen and Antwerp, and also make a general survey of the motor car situation in Eng-

land as well as the Continent. Some of the party will remain to visit the British Motor Car Show, which opens in the early fall, and possibly some of the Continental shows.

Mr. Sloan said that the overseas operations of General Motors are becoming of greater importance, and the policy of the corporation is to expand that phase of its business to the fullest possible extent.

Navy Orders New Type Twin-Engine Aircraft

WASHINGTON, July 8—The Navy Department has awarded contract to the Douglas Co. of Santa Monica, Cal., for three twin-engine bombing planes at a total cost of \$229,500. The planes will be used for experimental purposes, and if they are satisfactory more will be ordered.

The machines will be of a new design to be used for scouting, bombing and torpedo attacks, each having two 400-horsepower air-cooled motors. They are a variation of the SC three-purpose model now in quantity production for the navy. The new planes will be known as the T2-D and are to be convertible either as land planes or as twin-float seaplanes. The motors are mounted on the lower wings as tractors. The T2-D is a biplane with carrying capacity for a crew of three men and radio apparatus.

The experiment is in accord with the new naval policy to adapt multiple purpose aircraft for use with the fleet.

Kettering Says Efficiency of Engines Must Be Improved

NEW YORK, July 7—Motor car manufacturers in the United States will be forced either to build more efficient motors or to get more work out of fuel, says C. F. Kettering, president of the General Motors Research Corp., in a statement for Surgeon General Cumming outlining developments in the quest for an improved motor fuel which resulted in the discovery of ethyl gasoline, now under Federal investigation.

"We are getting today about 5 per cent of the energy out of gasoline; 95 per cent is thrown away," Mr. Kettering declares. "It is possible to push up on full load so that, as in the airplane engine or the motor boat engine, a maximum of 30 per cent can be obtained with fairly normal operation at around 20 per cent. Motors can be built that will give at least 50 per cent in efficiency."

"That is the problem which we are working at entirely from the economics of the situation, recognizing that today with the enormous increase in automobiles we will use 12,000,000,000 gallons of gasoline this year, and 15,000,000,000 gallons next year. At this increasing rate we must build motors of very much smaller size and sacrifice many advantages we now enjoy in the motor industry or do something which will allow us to get more work out of the fuel unit."

Reo Sales Advance 90 Per Cent in June

Stewart-Warner and Autocar Also Report Heavy Gains for Month

NEW YORK, July 6—Three concerns early in July announced increases in sales and production for the month of June.

In Lansing the Reo Motor Car Co. announced an increase of 90 per cent in shipments and sales compared with June, 1924. The company began July business with a third as many orders as its total June record. This was the result of heavy buying during the latter part of the month.

Owing to the increasing demand for the new heavy duty speed wagon and also for the motor buses, the company will not make the annual vacation general this year. The bus plant, which is producing the new heavy duty model, is included in this decision, as the sales are too heavy, company officials believe, to suspend operations for a fortnight.

In Chicago the Stewart-Warner Speedometer Co. announced that when its directors meet late in July they expect to declare earnings for the second quarter of the year in excess of those for the corresponding period of 1924. In addition they will declare the regular quarterly dividend of \$1.25 a share. July promises to bring heavy sales. June recorded a sales increase of 125 per cent over the same month last year.

David S. Ludlum, president of the Autocar Co., Ardmore, Pa., announced that the six months ending June 30 brought the greatest volume of business for a similar period in the company's twenty-seven years' experience.

Theological Students from Yale Study Ford System

DETROIT, July 7—Under the direction of a special supervisor chosen by the Ford organization, 50 students of the Yale theological school have entered the River Rouge plant of the Ford Motor Co. as employees. The plan is an experiment by Yale authorities, who believe that a period of experience in a modern manufacturing plant will lend weight to their words in future sermons.

The students have commenced their industrial experience as production men at the regular wage rate. They will be given a chance to study the problems of management, and round table discussions will be held weekly.

When the students leave in September, each will be called upon for a report embodying his impressions. The reports will be entered in a prize contest, which will be decided by five judges, who are Henry Ford, James J. Davis, Secretary of Labor; Raymond B. Fosdick of New York and Professors Jerome Davis and Edgar S. Furniss of Yale.

Germany Plans Tariff on Foreign Machines

American Export Product Forces Republic to New Protective Measure

BERLIN, July 1—At the present time there is still an embargo on automobiles in Germany, but since several new commercial treaties have been already agreed upon and others are pending, it will be necessary before long to adopt a new general tariff, which will also cover automobiles. The tariff bill will shortly come before the Reichstag, but it is expected that the discussion on it will be long drawn out and that the new tariff will not come into effect until fall.

The regular pre-war duty on motorcycles was 60-150 marks per 100 kg. (220 pounds), this being reduced by treaties to 40-100 marks. At the present time, if the import is permitted, the duty levied amounts to 240-600 marks per 100 kg., but under the new bill this is to be reduced to 350 marks to begin with. The rate of duty, however, is to be gradually reduced to 320 marks on July 1, 1925; to 290 marks on Jan. 1, 1927; to 250 marks on July 1, 1927; to 210 marks on Jan. 1, 1928, and to 160 marks on July 1, 1928.

Plan Gradual Reduction

The pre-war duty on passenger cars was 20-150 marks per 220 pounds; at present from 80 to 600 marks is being collected, and in the new tariff the duty is set down at 250 marks to begin with. This is to be reduced to 225 marks on July 1, 1926, to 200 marks on Jan. 1, 1927; 150 marks on July 1, 1927; 100 marks on Jan. 1, 1928, and 75 marks on July 1, 1928. This duty applies to motor vehicles and chassis weighing not more than 4840 pounds.

A lower duty is contemplated for vehicles weighing between 4840 and 7040 pounds, which includes chiefly the lighter types of commercial vehicles. On these only 80 marks is charged at the present time, but the new tariff contemplates an initial duty of 175 marks, which is to be reduced to 160 marks on July 1, 1926; to 130 marks on Jan. 1, 1927; to 100 marks on July 1, 1927; to 75 marks on Jan. 1, 1928, and to 40 marks on July 1, 1928.

A still lower rate applies to motor vehicles and chassis of a net weight of more than 7040 pounds; that is, heavy trucks, buses, etc. Before the war the general duty on this class was 20 marks, and the most favored nation rate 15 marks per 220 pounds. It is proposed to start with a rate of 150 marks and reduce this to 30 marks by July 1, 1928.

The duty on magnetos has been fixed at 200 marks per 220 pounds, and on other electrical machines at 150 marks.

It is pointed out that the lead which certain foreign automobile industries, particularly that of the United States,

have gained through quantity production makes it necessary to temporarily protect the German industry by a comparatively high duty, but that this is to be reduced to substantially the pre-war duty by the end of three years.

Ford Branches Take Over Business in Australia

FORD CITY, ONT., July 7—The Ford Motor Co. of Canada, Ltd., through its subsidiary companies, the Ford Manufacturing Co. of Australia Proprietary, Ltd., and the Ford Motor Co. of Australia Proprietary, Ltd., has taken over the assembly and distribution of its products in Australia.

Each of the Australian companies is capitalized at £1,500,000, and five plants are now being erected to take care of the growing Ford business in that country.

Ford bodies and such other parts that can be produced will be manufactured by the manufacturing company, while the assembly and distribution of the products will be carried out by the sales division. Both companies have headquarters at Geelong, while the sales company will have branches at Perth, Adelaide, Brisbane and Sydney.

Since 1905 when the shipment of Ford products began, until 1911-12, when over 1000 cars were shipped, the number has gradually increased until upward of 21,000 were shipped from here to Australia in 1923. This will be even higher for 1924, when final figures are released.

Studebaker Will Earn \$3.12 on Common Stock

NEW YORK, July 7—Indications are that profits of the Studebaker Corp. of America for the second quarter of the fiscal year ending June 30 will exceed \$6,000,000, or \$3.12 a share on 1,875,000 shares of no par common, after preferred dividends. This total added to the first quarter's net of \$3,605,780, or \$1.84 a share, would fix the total for the first six months at \$9,600,000, or \$4.96 a share. The total for the first six months of 1924 amounted to \$7,572,269, or \$3.88 a share.

The second quarter registered sales of 42,046 cars, against 28,152 in the same period last year, a gain of 49 per cent. April increased by 23 per cent, May 41 per cent, and June 112 per cent over the same months in 1924. Sales were 2000 cars over the schedule. In making the announcement, President Erskine predicted that July will establish a new record for sales and profits.

TO MAKE ANTI-KNOCK FUEL

BOSTON, July 7.—Four concerns here have become associated in the Petroleum Chemical Corp., to produce a new anti-knock motor fuel, it was announced today. The four are: National Distillers Products, Barnsdall Corp., Blair J. Co., Inc., and Arthur D. Little, Inc. The corporation intends to manufacture on a large scale.

FINANCIAL NOTES

Chrysler Corp., 239,700 shares of series A cumulative preferred stock have been approved for listing for trading privileges by the governors of the New York Stock Exchange, together with 680,000 shares of common stock, both issues without par value. The listing applies to temporary certificates and permission is granted to substitute permanent engraved certificates on official notice of issuance.

Eaton Axle & Spring Co. estimated net earnings for the first six months of this year, after charges, but before Federal taxes, exceeded \$400,000, as compared with \$247,000 in the corresponding period of 1924. The balance available for the capital stock is estimated in excess of \$1.50 a share for the 229,000 shares after taxes, as the company has no bonds or preferred stock.

Swinehart Tire & Rubber Co. in its comparative balance sheet for the year ending Dec. 31, 1924, shows total current assets of \$1,158,577 as compared with \$1,087,277 for the previous year. Total liabilities are \$1,799,166 as compared with \$1,804,169 for 1923. Net working capital is given as \$520,856.

Spicer Manufacturing Corp. estimated net earnings for the first six months of this year are over \$1,000,000, after deduction of taxes and preferred dividends, equal to more than \$3 a share on the 313,750 no par shares of common.

General Motors Acceptance Corp. has received authorization to open branches in Antwerp, Buenos Aires and Sao Paulo, Brazil. Announcement came from the banking department of the State of New York.

Moon Motor Car Co. directors have declared the regular quarterly dividend of 75 cents a share on the 180,000 shares of no par value common stock, payable Aug. 1 to holders of record July 15.

Nordyke & Marmion Co. net earnings for the last six months were \$1,174,198, according to a report submitted to stockholders by G. M. Williams, president.

United States Rubber Co. has declared the regular quarterly dividend of 2 per cent on the first preferred stock, payable Aug. 15 to holders of record July 20.

Briggs Manufacturing Co. has declared the regular quarterly dividend of 87½ cents a share payable July 25 to holders of record July 10.

Kelsey Wheel Co., Inc., directors have declared a cash dividend of \$1.75 a share payable Aug. 1 to holders of record July 20.

Mullins Body Corp. has declared the quarterly dividend of \$2 on the preferred stock, payable Aug. 1 to holders of record July 15.

VELIE SALES GAIN

MOLINE, July 7—Velie Motors Corp. is having one of the best years in its history, according to a statement from C. W. Hadden, general sales manager. Shipments during the past nine months have exceeded the corresponding months of the previous year with one exception. Export shipments for the first five months of 1925 were approximately 50 per cent greater than during the corresponding period of last year.

Coming Events

SHOWS

Sept. 8-11—New Haven, Mason Laboratory, Yale University Machine Tool Exhibition, direction of Amer. Society of Mech. Eng., Chamber of Commerce and Yale Mechanical Engineering Department.
Sept. 14-19—Cleveland, Public Auditorium, Annual Convention and Exposition, American Society for Steel Treating, W. H. Eisenman, secretary.
Sept. 21-26—London, England, Annual Cycle and Motorcycle Show under auspices of the British Cycle and Motorcycle Manufacturers and Traders Union, Ltd.

Sept. 28-Oct. 3—Chicago, Fourteenth annual Safety Congress and Exhibit, Rainbow Room, Hotel Winton, under direction of National Safety Council, A. M. Smith, business manager.

Oct. 5-9—Atlantic City, Young's Million Dollar Pier, Manufacturers' Exhibition in connection with American Electric Railway Association Convention.

Oct. 8-17—London, Olympia passenger car show.

Oct. 29-Nov. 7—London, annual truck show.

Nov. 26-Dec. 6—Berlin, Germany, Annual Automobile Show in the Kaiserdamm.

CONVENTIONS

Sept. 14-19—Cleveland, Public Auditorium, Annual Convention and Exposition, American Society for Steel Treating.

Oct. 5-9—Atlantic City, Young's Million Dollar Pier, American Electric Railway Association.

Oct. 7-10—Montreal, Motor and Accessory Manufacturers Association Convention.

RACES

July 26—Paris, Montlhéry Track, French Grand Prix.

Sept. 7—Altoona, Pa.

Sept. 19—Syracuse, N. Y.

Sept. 30—Fresno, Cal.

Oct. 10—Baltimore-Washington Speedway, Laurel, Md.

Oct. 12—Salem, N. H.

Oct. 24—Charlotte, N. C.

Nov. 26—Los Angeles.

S.A.E. MEETINGS

National

Sept. 15-16—Cleveland, Production meeting and exhibition.

Nov. 12-13—Philadelphia, Automotive Transportation meeting.

Nov. —Service Engineering meeting.

Maudslay Motors Has New Safety Chassis

LONDON, July 1 (by mail)—A safety coach chassis designed to provide maximum safety at high speed has been introduced here by the Maudslay Motors Co. of Coventry. The coaches are intended for operation at speeds up to 40 miles an hour. Three models have been completed.

The M.L.2 model has a 180-in. wheelbase and is intended for open coaches carrying twenty-two passengers. The M.L.3, with a wheelbase of 198 in., is constructed to carry a single-deck bus body with capacity for thirty-seven passengers. The M.L.4 has a 200-in. wheelbase and is adaptable for saloon buses seating thirty persons.

The M.L.3 model, with forward type of construction, has an unusually long body, slightly more than 25 ft. being available behind the dash. A low center of gravity is aimed at throughout. The clearance of the rear axle is 11 in. and the tread is 69 in. between the centers of the rear wheels and 72 in. at the front. The rear springs, which are 54 in. long and 3 in. wide, are virtually flat under the load, while the front spring has a length of 40 in.

The powerplant is similar to the other Maudslay models. Several improvements are noted, among them an oil filter. The rated speed of the engine is 2000 r.p.m., at which the M.L.2 engine develops 60 hp., and the M.L.3 and M.L.4 engines, 70 hp.

Foot brakes on all the models operate on the transmission, but with it is combined the device for operating the Perrot type front brake. The engine propeller shaft and the gear box have been aligned by inclining the subframe. The chassis is built low, necessitating a single step into the coach.

MILES' CONDITION GAINS

NEW YORK, July 8—Sam Miles, show manager of the N. A. C. C., is recovering from a recent illness and has been able to enjoy several short motor trips. He and Mrs. Miles have gone to their summer home at Christmas Cove, Me.

CHANGE RADIATOR ON STUDEBAKER MODEL

SOUTH BEND, July 8—All Studebaker models on the Standard Six chassis are now being equipped with a radiator shell of improved appearance. Earlier Standard editions carried a shell whose upper part, while of convex shape, had a somewhat flat appearance. The new shell, which is interchangeable with those of the former style, has a perfectly rounded contour and is very similar to the Big Six design, except that the fluting or scroll work is eliminated. A slight change has also been made in the shape of the side rear quarter windows on the duplex phaetons.

Export Managers Form Organization in Detroit

DETROIT, July 7—Formation of the Export Managers Club composed of the various export managers of the automobile concerns was affected recently with the election of W. E. Morrison, Paige-Detroit Motor Car Co., export manager, as president. It has 60 active members with applications yet to be acted upon.

Other officers elected are: Samuel Fitzpatrick, Federal Motor Truck, first vice-president; E. P. West, Detroit Belt Casing Co., second vice-president; W. E. Vaughan, treasurer, Department of Commerce, and H. H. Tewksbury, secretary, Department of Commerce. The board of directors includes the above officers with the following: R. R. Daley, Frederic Stearns, G. H. Howell, J. H. Needham, J. Howard Rees, J. H. Teagan and H. B. Trix.

Arrangements have been made for two meetings each month, one being a meeting with a special speaker and the other being open discussion night for club members. It is probable that papers prepared by the different members along export lines will be read. Club rooms will be established in order that foreign guests may be entertained when in the city.

Curtiss Secures Record Order for Mail Planes

NEW YORK, July 8—The Curtiss Aeroplane Motor Corp. has been awarded what is considered the largest order for commercial planes ever authorized in America. The National Air Transport Co. under government contract to transport air mail, has ordered ten planes of the "carrier pigeon" type for night service which was inaugurated July 1.

While the amount of the transaction was not made public, Curtiss officials expressed the opinion that the deal would mark the opening of a new business which would aggregate between \$2,000,000 and \$3,000,000 before fall.

The planes are to be designed especially for night flying over the Allegheny Mountains. Each plane will be equipped with a 400-hp. Liberty motor.

The announcement was made by Howard E. Coffin, president of the National Air Transport Co., who said that he had just completed a survey of the European situation, where air transportation is becoming a common and efficient method for shipping package freight. Mr. Coffin added that in Europe at least six air transport concerns will use planes equipped with three engines this year, indicating the tendency toward multi-motor planes.

APPERSON OUTPUT GROWS

KOKOMO, IND., July 6—Apperson sales and deliveries for the month of June not only exceeded the total for any summer month in the company's 33 years of continuous production, but also exceeded the figures for May of this year and brought the total for the first six months of 1925 to a new high mark, according to a statement made by Don C. McCord, president of the Apperson Automobile Co. Mr. McCord says that the company has on hand the "largest total of unfilled orders since March 1."

Apperson sales have been mounting steadily since Jan. 1, when the present line of Straight-Away eights and Super-Value sixes were announced, according to company executives. Production has been stepped up each month.

AUTOMOTIVE INDUSTRIES

VOLUME 53

New York, Thursday, July 16, 1925

NUMBER 3

Registrations as of July 1 Show Gain of 13.7% Over Last Year

Figures indicate that motor vehicles in United States will approach

19,000,000 by end of 1925. Illinois passes million mark.

Florida and Texas gain heavily. Motorcycles drop.

By K. W. Stillman

MOTOR vehicle registrations in the United States totaled 17,548,377 on July 1, 1925, a gain of 2,108,407, or 13.7 per cent, over July 1, 1924, according to a survey just completed by AUTOMOTIVE INDUSTRIES.

Registrations at the end of the first six months of this year are nearly as high as the 17,605,501 recorded on Dec. 31, 1924, as the total for the whole of last year. With six months yet to go, total registrations at the end of the year are certain to surpass those of 1924 by a good margin, indications now being that the Dec. 31, 1925, figure will be very close to 19,000,000.

New York, as in previous years, holds first place, 1,332,168 motor vehicles having been registered in that State since the beginning of the year. California holds second position, with 1,283,203, and Ohio is third, with 1,232,943.

The real estate boom in Florida evidently has had a highly favorable influence on automobile sales in that State, the number of registrations today being 51.2 per cent greater than on July 1 last year. This is the largest percentage gain recorded by any State.

Texas has the largest numerical gain over last July, with an increase of 191,710.

There is one motor vehicle to every 6.47 persons in the country today, population estimates of the Bureau of Census for July 1, 1925, having been used for the calculation. At this time last year there was one vehicle to every 7.2 persons.

Fees paid into the various State treasuries by automobile owners for vehicle licenses totaled 218,333,826 for the first six months.

Motorcycle registrations dropped again, the registrations in the first six months of 1925 being more

than 10,000 less than in the first half of 1924. The present total is 115,400.

While passenger car and truck figures (the latter including buses) show a substantial gain over those recorded a year ago, the present registration is 57,118, or 0.3 per cent, less than the registration of Dec. 31, 1924. This is the first time that the mid-year figures have been less than those recorded at

Motor Vehicles in U.S.

July 1st 1924 15,439,970

July 1st 1925 17,548,377 *
(13.7% increase)

Dec. 31st 1925 19,000,000
(Estimated) (8% increase)

* One motor vehicle to every 6.47 persons in the United States.

the close of the preceding year, but there are several explanations as to why this might occur and is likely to happen with increasing frequency in the future.

Each year more cars and trucks are being scrapped, and as the number of motor vehicles in service continues to increase, so will the number of cars scrapped increase. It is fair to assume that a very large proportion of the cars scrapped since Jan. 1, 1924, were licensed during that year, and therefore, appear in the Dec. 31, 1924, registration figures published in AUTOMOTIVE INDUSTRIES. These cars have not been registered this year, and for that reason a deficit occurs which has not yet been overcome by new production.

It would be exceedingly difficult to estimate with any degree of accuracy the number of cars and trucks that have climbed the scrap heap. Estimates of motor car life furnish as good a guide as any, but these vary from seven to ten or more years. If the

average life of a motor vehicle is assumed to be seven years, then the number scrapped during 1924 should be the same as the number produced seven years ago in 1917, or about 1,870,000. If ten years is taken as the life of cars the 1914 production of about 570,000 cars and trucks would have passed out during 1924. Which of these figures is nearest to the truth would be hard to say with any conviction. Probably 750,000 would be pretty close to the right figure. Whichever is right, it is obvious that there is somewhere around a million motor vehicles that appeared in the 1924 registration figures but which have not been registered this year.

This year there are five States with over one million cars and trucks, Illinois having joined New York, California, Ohio and Pennsylvania, who were in this class last July. There are eleven States and the District of Columbia, that still have less than 100,000 cars each.

There are now 14 States that have registered over 500,000 motor vehicles up to July 1. Michigan, Indiana, Texas, Iowa, Massachusetts and Illinois, besides the over-a-million States of last year, were in this position a year ago. This year Missouri, Wisconsin, Minnesota and New Jersey have climbed above the half-million mark. The first nine States, from New York to Iowa, have nearly 52 per cent of all the cars in the country.

Six States record increases of 100,000 or more over last July figures, and only 11 States show increases of less than 10,000. Every State but Delaware gained, and even the District of Columbia, which last July showed a loss, gained nearly 18,000 this year.

The total gain of 2,108,407 is slightly less than that recorded last year—2,475,770—which may be explained, at least in part, by the greater number of cars that, in all probability, were scrapped during 1924.

Cars and Trucks in the United States, July 1, 1925

New York	1,332,168
California	1,283,203
Ohio	1,232,943
Pennsylvania	1,213,909
Illinois	1,123,565
Texas	853,659
Michigan	799,188
Indiana	640,389
Iowa	610,905
Massachusetts	551,263
Missouri	535,528
Wisconsin	534,662
Minnesota	519,168
New Jersey	505,852
Oklahoma	425,000
Kansas	406,990
North Carolina	332,145
Washington	295,179
Nebraska	280,000
Florida	257,000
Virginia	231,700
Kentucky	227,176
Tennessee	218,408
Connecticut	217,166
Maryland	212,504
Colorado	207,844
Georgia	207,562
Alabama	193,164
West Virginia	180,850
Oregon	179,388
Louisiana	173,930
Arkansas	150,070
Mississippi	148,645
South Carolina	143,079
South Dakota	140,787
Maine	131,000
North Dakota	126,094
Rhode Island	89,773
District of Columbia	84,492
Montana	83,950
New Hampshire	73,120
Utah	71,193
Idaho	68,592
Vermont	60,424
Arizona	59,941
Wyoming	42,500
New Mexico	40,550
Delaware	34,000
Nevada	17,759

Total17,548,377

Percentage Gains and Losses in Car and Truck Registrations—July 1, 1924 to July 1, 1925

Gains	
Florida	51.2
Alabama	44.9
Oklahoma	44.2
Tennessee	32.2
Mississippi	30.3
Texas	29.0
Arkansas	28.4
District of Columbia	27.1
Maine	24.7
North Dakota	22.6
Arizona	21.9
Louisiana	21.6
Montana	21.5
Utah	21.4
Maryland	20.9
West Virginia	19.6
Georgia	18.5
Connecticut	16.9
North Carolina	16.5
New Jersey	16.1
New Mexico	15.0
Vermont	14.8
Rhode Island	14.5
New York	13.9+
Illinois	13.9—
New Hampshire	13.6
Wisconsin	12.8
Kansas	12.7
Wyoming	12.4
Missouri	12.3
Minnesota	12.2
Pennsylvania	11.5
Massachusetts	11.3
Nevada	11.0
Oregon	10.9
Colorado	10.7
South Dakota	10.5
Indiana	10.1
California	8.7
Idaho	8.4
Iowa	7.3
Ohio	6.3
Kentucky	6.2
Michigan	4.5
South Carolina	2.8
Washington	1.6
Nebraska	1.1
Virginia	0.8

Losses	
Delaware	2.9
Average for U. S. (gain)	13.7

Numerical Gains and Losses in Car and Truck Registrations—July 1, 1924 to July 1, 1925

Gains	
Texas	191,710
New York	163,023
Illinois	137,085
Oklahoma	130,000
Pennsylvania	125,522
California	102,403
Florida	87,000
Ohio	72,943
New Jersey	69,958
Wisconsin	60,599
Alabama	59,855
Indiana	58,814
Missouri	58,472
Minnesota	56,391
Massachusetts	55,925
Tennessee	53,238
North Carolina	47,145
Kansas	45,959
Iowa	41,547
Maryland	36,786
Mississippi	34,575
Michigan	34,144
Arkansas	33,205
Georgia	32,462
Connecticut	31,403
Louisiana	30,930
West Virginia	29,628
Maine	25,939
North Dakota	23,270
Colorado	20,169
District of Columbia	17,991
Oregon	17,649
Montana	14,850
South Dakota	13,387
Kentucky	13,176
Utah	12,560
Rhode Island	11,360
Arizona	10,780
New Hampshire	8,750
Vermont	7,810
Idaho	5,324
New Mexico	5,277
Washington	4,741
Wyoming	4,700
South Carolina	3,831
Nebraska	3,048
Virginia	1,916
Nevada	1,764

Losses	
Delaware	1,000
Net gain	2,108,407

The gain of 191,710 made by Texas was not only the largest recorded this year, but it placed Texas ahead of Michigan in sixth place as to number of cars and trucks registered. Evidence that oil is a profitable business is seen in the fact that Oklahoma, while fifteenth in number of cars registered, ranks fourth in actual gains over last July with 130,000. This number is exceeded only by Texas, New York and Illinois. Florida, which was first in percentage gain, ranks seventh in numerical gains, with 87,000, and heads the list of States with gains less than 100,000.

New Jersey joins New York, California, Pennsylvania, Ohio and Illinois this year in the group of States that operate over 100,000 trucks. New York and Pennsylvania

are the only States with more than 10,000 motor cycles, and there are 22 States with less than 1000 motor cycles registered.

Total fees of \$218,333,826 average about \$12.50 for each car and truck registered, slightly less than the per vehicle charge of last year. These figures contain some discrepancies which are caused by the variations in State registration methods. In those States that have a gasoline tax there is no uniformity of method in including sums thus obtained in the published amount of fees received. Some States include the tax, others do not. Some States deduct refunds from published figures, others do not.

In percentage gains, Florida went over the top with a bang. On July 1, 1925, there were 51.2 per cent more

Motor Vehicle Registration Statistics July 1, 1925

States	Total Registrations of Cars and Trucks	Passenger Cars	Trucks	Motorcycles	Total Fees
Alabama	193,164	171,459	21,705	545	\$1,785,073
Arizona	59,941	51,900	8,041	280	365,345
Arkansas	150,070	130,000	20,070	186	3,021,440
California	1,283,203	1,090,406	192,797	9,320	6,759,392
Colorado	207,844	192,651	15,193	1,394	1,280,187
Connecticut	217,166	184,421	32,745	3,193	5,069,455
Delaware	34,000	28,000	6,000	400	584,940
District of Columbia	84,492	73,644	10,848	1,324	166,677
Florida	257,000	217,000	40,000	950	3,000,000
Georgia	207,562	182,594	24,968	731	2,718,239
Idaho	68,592	63,158	5,434	435	1,322,454
Illinois	1,123,565	981,859	141,706	5,169	11,890,534
Indiana	640,389	557,199	83,190	4,500	4,326,384
Iowa	610,905	568,605	42,300	2,095	9,099,441
Kansas	406,990	366,271	40,719	1,046	4,104,050
Kentucky	227,176	204,222	22,954	531	3,346,163
Louisiana	173,930	146,860	27,070	505	2,800,273
Maine	131,000	111,000	20,000	1,000	1,991,200
Maryland	212,504	199,428	13,076	2,500	2,064,901
Massachusetts	551,263	464,676	86,587	8,624	7,431,385
Michigan	799,188	716,745	82,443	2,543	11,365,124
Minnesota	519,168	479,979	39,189	2,622	9,037,663
Mississippi	148,645	133,781	14,864	55	675,335
Missouri	535,528	486,146	49,382	1,589	6,380,508
Montana	83,950	73,350	10,600	192	62,151
Nebraska	280,000	250,000	30,000	700	3,500,000
Nevada	17,759	15,070	2,689	76	188,710
New Hampshire	73,120	64,528	8,592	1,304	1,045,654
New Jersey	505,852	397,379	108,473	6,175	9,198,365
New Mexico	40,550	39,283	1,267	184	445,628
New York	1,332,168	1,096,308	235,860	15,295	21,286,025
North Carolina	332,145	304,143	28,002	1,400	4,500,000
North Dakota	126,094	118,624	7,470	325	866,266
Ohio	1,232,943	1,083,797	149,146	8,827	11,969,324
Oklahoma	425,000	390,000	35,000	800	4,100,000
Oregon	179,388	165,945	13,443	2,063	4,838,777
Pennsylvania	1,213,909	1,040,093	173,816	13,396	19,605,801
Rhode Island	89,773	74,119	15,654	1,115	1,520,703
South Carolina	143,079	129,790	13,289	153	1,621,198
South Dakota	140,787	139,616	1,171	290	2,401,000
Tennessee	218,408	198,047	20,361	563	2,745,139
Texas	853,659	776,154	77,505	2,201	8,676,292
Utah	71,193	61,633	9,560	557	99,677
Vermont	60,424	56,083	4,341	576	1,350,639
Virginia	231,700	222,500	9,200	1,100	3,813,317
Washington	295,179	253,990	41,189	2,327	4,445,925
West Virginia	180,850	158,400	22,450	1,135	2,529,122
Wisconsin	534,662	476,188	58,474	2,902	7,190,450
Wyoming	42,500	38,000	4,500	207	467,500
Totals	17,548,377	15,425,044	2,123,333	115,400	\$218,333,826

cars registered in that State than on July 1, 1924. Alabama and Oklahoma were close behind, with gains of 44.9 and 44.2 per cent respectively. Convincing evidence of the prosperity of the South is given in the table of percentage

gains. Of the 15 States, including the District of Columbia, that recorded gains of 20 per cent or more over last year's figures, only four of them—Maine, North Dakota, Montana and Utah—are north of the Mason-Dixon line.

The seven States and the District of Columbia that have gained more than 25 per cent are all in the land of cotton. Only 1 State gained less than 10 per cent, with Virginia last, with a gain of 0.8 per cent.

The number of motor vehicles continues to increase faster than the population. There are now 6.47 persons per motor vehicle, as compared with 7.2 just one year ago. California continues to lead, with 3.1 persons per car. Last year only California, Iowa, Nebraska and Nevada had less than five persons per car. This year sees the addition of Florida, Kansas, Oregon, South Dakota, Indiana, Colorado and Minnesota, which have a motor vehicle for every family in the State, if we consider the average family as consisting of 4.5 persons. Although Georgia and Alabama still are last, they both have made long strides during the past 12 months. Alabama advanced from 18.3 persons per car to 12.8, and Georgia has come from 17.2 to 14.7.

Only eight States recorded an increase in motorcycle registrations for a total of 939, against a total decrease in the other States of 11,285. Four States showed no change from last year's figures.

There still remains considerable difficulty not only in obtaining accurate registration figures from the various States, but in interpreting them so that direct comparisons can be made with the figures of other States.

Difficulty in obtaining figures results from several causes. A rather prevalent one is that many States delegate local authorities to issue licenses, and reports from these stations are made only periodically, so that information to be obtained from the State is always incomplete. Arkansas, Kentucky, Virginia and Kansas issue licenses through county or town officials, and in Arkansas only quarterly reports are made to the State.

A number of the States issue licenses from more than one place, but all under States supervision. This causes delay, however, in the publication of consolidated reports for the State, and probably is the principal reason why New York and Louisiana are unable to furnish figures much less than a month old. In this tabulation registrations for June 1, 1925, were the best obtainable from these States, but as the same condition obtained last year

Percentage Gains and Losses in Car and Truck Registrations Dec. 31, 1924, to July 1, 1925

BECAUSE of the impossibility of obtaining complete registration figures from many of the States in the middle of the year direct comparison is possible only with mid-year figures of other years. End-of-the-year figures are complete and invariably show proportionately larger registrations than is shown in the middle of the year. For this reason the tables below comparing July 1, 1925, registrations with those of December 31, 1924, are given as a matter of interest only. They can not be taken as a true indication of the relative progress of the automotive industry since the close of last year.

Gains		Losses	
Florida	32.4	Nebraska	9.3
Oklahoma	23.9	Michigan	8.0
Alabama	22.8	Oregon	6.9
Mississippi	10.5	New York	5.7
Maryland	8.7	West Virginia	4.9
North Carolina	8.3	Massachusetts	3.7
North Dakota	7.7	Nevada	3.4
Tennessee	6.7	Delaware	3.2
Arkansas	5.7	New Mexico	2.9
Montana	5.4	California	2.9
District of Columbia	4.7	Wyoming	2.6
Arizona	3.7	Colorado	2.5
Minnesota	3.2	Louisiana	2.3
Maine	3.0	Kentucky	2.0
Utah	2.8	Missouri	1.7
Texas	2.4	Iowa	1.6
Wisconsin	1.8	Indiana	1.5
New Hampshire	1.7	Vermont	1.2
Connecticut	1.3	Pennsylvania	1.2
New Jersey	0.3	South Dakota	1.0
Washington	0.1	Rhode Island	1.0
		Kansas	1.0
		Idaho	0.9
		Ohio	0.9
		Georgia	0.8
		Illinois	0.1
		Average for U. S., 0.3 per cent loss	
Losses			
South Carolina	12.4		
Virginia	11.4		

Numerical Gains and Losses in Car and Truck Registrations Dec. 31, 1924, to July 1, 1925

Gains		Losses	
Oklahoma	82,018	Virginia	29,943
Florida	62,804	Nebraska	28,713
Alabama	35,902	Massachusetts	21,052
North Carolina	26,389	South Carolina	20,303
Texas	19,619	Pennsylvania	14,677
Maryland	16,923	Oregon	13,241
Minnesota	16,181	Ohio	11,057
Mississippi	14,098	Iowa	10,001
Tennessee	13,728	Indiana	9,830
Wisconsin	9,441	West Virginia	9,284
North Dakota	9,033	Missouri	9,107
Arkansas	8,087	Colorado	5,403
Montana	4,255	Kentucky	4,608
Maine	3,822	Louisiana	4,070
District of Columbia	3,772	Kansas	3,901
Connecticut	2,848	Georgia	1,738
Arizona	2,113	South Dakota	1,493
Utah	1,966	New Mexico	1,200
New Jersey	1,662	Wyoming	1,139
New Hampshire	1,191	Delaware	1,136
Washington	367	Rhode Island	879
		Vermont	755
		Idaho	633
		Nevada	628
		Illinois	159
Total	336,219	Total	393,337
Losses			
New York	80,711		
Michigan	69,399		
California	38,277		
			57,118 net loss

Persons Per Motor Vehicle, July 1st, 1925

California	3.13	Michigan	5.20	Delaware	6.90	New Mexico	9.35
Iowa	4.10	Wyoming	5.22	Utah	6.92	Virginia	10.57
Florida	4.25	Wisconsin	5.24	New Jersey	6.93	Louisiana	10.80
Nevada	4.36	Oklahoma	5.27	Connecticut	7.05	Kentucky	10.95
Kansas	4.46	North Dakota	5.44	Rhode Island	7.12	Tennessee	11.10
Oregon	4.72	Vermont	5.83	Idaho	7.17	Mississippi	12.05
South Dakota	4.73	District of Columbia	5.89	Maryland	7.23	Arkansas	12.35
Indiana	4.78	Texas	5.97	Massachusetts	7.49	South Carolina	12.43
Nebraska	4.84	Maine	5.97	Pennsylvania	7.66	Alabama	12.77
Colorado	4.90	New Hampshire	6.16	Montana	7.70	Georgia	14.74
Minnesota	4.94	Illinois	6.20	North Carolina	8.31		
Washington	5.01	Missouri	6.47	New York	8.34		
Ohio	5.13	Arizona	6.80	West Virginia	8.85	Average U. S. ...	6.47

they are directly comparable with the 1924 figures.

Very few States are in a position to give complete and accurate figures within a few days after the close of the month. With very few exceptions, where complete figures were not available estimates were made by the various State authorities of the unknown figures so that the figures published here are as nearly accurate as can be obtained at this time.

After figures are received from the States there is still some difficulty in interpreting them, since nearly every State uses a different terminology and different registration methods. For example, New Mexico has two classes of registrations—commercial and non-commercial. Commercial registrations include cars and trucks operated for hire and all trucks over 1½-ton capacity. Non-commercial class includes all other cars and trucks. New Hampshire segregates cars and trucks for its year-end tabulations, but this segregation is not available at this time.

Massachusetts, Utah and the District of Columbia add to their total registration figures each transfer that takes place. To make totals for these States comparable with those of other States these transfers must be deducted. Since this condition was discovered after the December, 1924, figures were published, both the July and December,

1924, figures shown in the present tabulation have been altered to show the true condition in these three districts.

Another item in which lack of uniformity in registration methods prevails is in the issuing of license tags to replace those lost, damaged or stolen. Five States and the District of Columbia count these duplicate plates as new registrations and include them in their total registration figures.

Methods of registering non-residents vary also. Some States do not register nonresidents. Other States register them but do not include these registrations in their total figures. Still other States register non-residents, include them in their total figures, but segregate them so they may be deducted from resident registrations. And finally, the largest number of States register non-residents, include them in their total figures, but do not segregate them from resident registrations.

Each of the possible discrepancies mentioned, however, is of minor importance and has very little effect on the use of the registration figures for ordinary statistical work in connection with market analysis. If all the errors were balanced one against the other it is doubtful if the total in either direction would be much in excess of 5 per cent.

Motion Pictures Used in France to Study Front Wheel Shimmy

TO assist in solving the shimmy problem, Michelin is distributing to French automobile manufacturers a moving picture film of experiments carried out by his engineering staff. The movie camera was fitted up on the back of a car in such a way that it could take pictures of the front end of an automobile which either followed under its own power or was towed.

Most of Michelin's experiments were carried out on a 12 hp. Renault fitted with balloon tires of 160 mm. section, which gave a pronounced shimmy at a speed of 50 m.p.h. The pictures were thrown on the screen at slow speed in order to follow all the movements of the front end of the car in close detail. There was clearly observable a double movement of the steering wheels around their pivots and of the entire axle in a longitudinal plane, with variations in load on the two springs.

While Michelin did not suggest any definite remedy, his experiments helped to simplify the problem and to indicate the lines on which research should be made. It was found that by increasing the tire pressure the shimmy could be carried up to appear at a higher road speed. A car without springs produced such an acute form of

shimmy that it was impossible to hold it under high speed.

Independent suspension of the front wheels was found to be no remedy for shimmy, for the evil existed as strongly on the Lancia Lambda as on a more normal type of chassis. A flexible chassis produced more shimmy than a stiff one.

One car with a rather flexible frame and quarter elliptic front springs was devoid of shimmy until front wheel brakes were fitted. Relieving the load on the front axle by lifting the engine out and towing the car made no difference to the degree of shimmy. A device designed to eliminate all lateral displacement of the front axle exaggerated the shimmy. It was found that a pressure of a few ounces was sufficient to eliminate shimmy in its initial stages, but that when the movement had assumed a certain amplitude nothing could stop it. The variations in the load on the pair of front springs were as high as 300 lb. in some cases, causing the leaves to open and spread.

An engineer is showing this film and giving explanations on the experiments in all the leading French automobile factories.

High Production Capacity a Feature of New Internal Grinder

Machine developed by Heald Company has quick traverse. Is provided with size indicating gage. Wheel is trued and rate of feed automatically reduced for the finish grinding.

By P. M. Heldt

A NEW internal grinding machine for rapid production work and in which many of the movements that formerly had to be effected by the operator are accomplished automatically, has been brought out by the Heald Machine Co. of Worcester, Mass. In this machine the sizing of the parts is done by means of a direct reading indicator. Greater production and more accurate work are advantages claimed by the manufacturer.

After having inserted a piece of work in the chuck, the operator locks it by the collet lever, Fig. 1. He starts operations by means of the reversing lever, and the wheelhead then moves from its position of rest at the extreme right, at full speed up to the work. As the wheel is about to enter the hole the wheel head automatically slows down to the grinding speed. The wheel is then traversed through the hole back and forth, the length of its stroke being set to correspond to the depth of the hole, and at each end of the stroke it is automatically fed toward the work by a constant, predetermined amount.

This continues until the hole is within 0.003 in. or so of the finished size, the exact amount being determined by adjustment. Then the cross feed is automatically reduced to 0.0002 in. per stroke for the finish grinding. Noting from the indications of the dial that the rough grinding has been completed, the operator lifts a latch,

which allows the wheel to run out beyond the limit of the grinding stroke sufficient to be trued up for the finishing operation. He also trips the ball ended lever seen to project up from the machine, which brings the truing diamond into position, and he simultaneously pulls the control lever against a stop, thereby reducing the rate of travel of the wheel. Truing of the wheel takes place during one pass in both directions, and the wheel then automatically returns to its former limits and rate of travel, the diamond being pushed out of the way.

The feed then continues at the rate of 0.0002 in. per stroke until the finish size is reached, as shown by the indicator. Finish grinding being done with a true, clean and sharp wheel, it is claimed that an accurately round hole without bell mouth is obtained.

When the finish size is reached the operator steps on the treadle, and the wheelhead then returns at full speed to the position of rest. At the same time the work and the water supply are automatically stopped, and a guard is lowered over the wheel.

The indicator is bolted onto the bridge which carries the workhead and is provided with a bar with a finger at its outer end, which latter carries a diamond that is constantly in contact with the surface of the hole, at a point opposite the line of contact of the wheel. The indicator is set to register zero when the hole attains the correct size.

When the table is withdrawn to the position of rest, the finger of the indicator automatically swings out of the way, so as not to interfere with removal of the work and reloading. The finger, moreover, can also be swung out of the way when it is desired to true up a new wheel or to grind a master hole.

Passing now to a consideration of the more important details of construction, it may be pointed out that the work spindle is of high carbon steel and at one end is provided with a large flange which assists in lining up chucks and holding fixtures. It has a 1½ in. axial hole in it. The spindle runs in self-adjusting radiol ball bearings.

A lever engaging a cone clutch on the inside of the spindle drive pulley starts and stops the work and the water supply simultaneous-

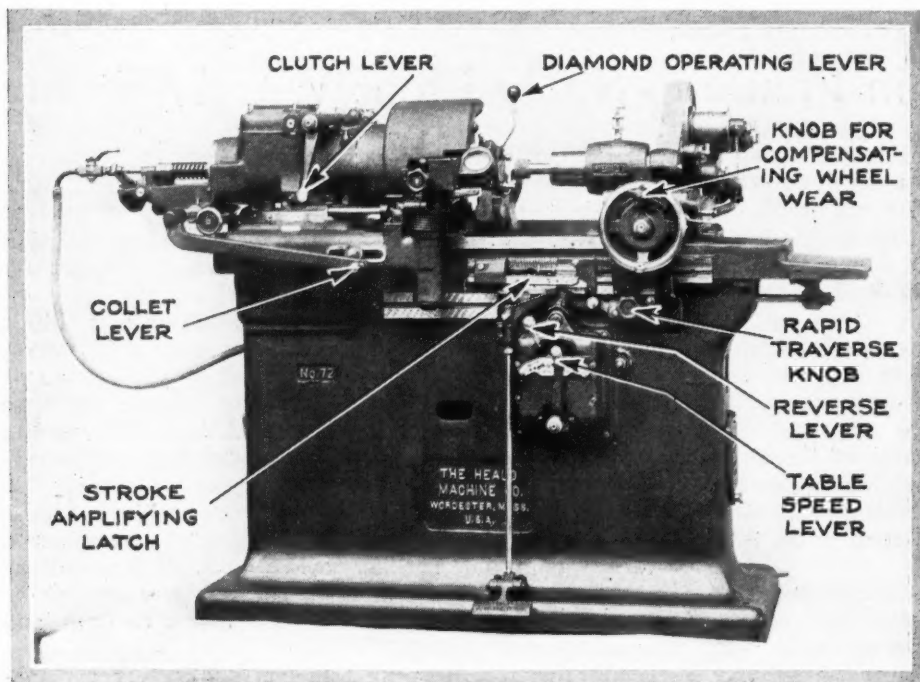


Fig. 1—Front view of new Heald internal grinder

ly. Water is carried through the spindle and flows over and floods the work, thus equalizing the temperature and preventing distortion.

Provision is made for passing a collet-operating tube through the work spindle, which can be arranged to operate draw-in collets or special holding fixtures of either the draw-back or push-forward type. All loading of the work is conveniently done from the forward side of the machine. A large work guard with spring hinge can be readily swung when it is necessary to get at the work or the chuck.

There are five changes of work speed. The machine is set for coarse feed of the wheel for rough grinding, and when this operation has been completed it automatically changes to fine feed for the finish grinding. The change is positive and takes place just before the diamond begins to true the wheel.

In truing a new wheel the operator must necessarily run his cross slide back to get position, and it is also desirable to have a wheel of the maximum diameter for the hole. For this reason the cross slide is provided with a simple stop which indicates to the operator when he has reduced the wheel to a size that will enter the hole, and it also gives him the correct position for the cross slide relative to the work, so that he can start to grind immediately.

As in all the more recent designs of the Heald company, grinding is done on the far side of the hole, which ensures to the operator a clear view of the work. It also keeps the spindle seated in the bearings and thus tends to prevent bell mousing.

The main table travels on a flat and a V way, and is of sufficient length to protect them from grit and dirt in all positions. It is driven by a fluid pressure mechanism containing oil under constant pressure. Change of speed is obtained by means of throttle control of the oil flow, and the speed therefore can be varied at will between zero and the maximum of 50 ft. p.m. Reversal is accomplished by moving the ball-handled lever in the direction in which movement is desired and can be effected at any point of the stroke.

Three adjustable dogs are provided for adjusting the stroke of the table. Two of these are set to fix the grinding stroke, while the third, which is a sliding member, allows the table to withdraw sufficiently so that the wheel will pass the diamond during the truing operation, after which the wheel returns to the grinding stroke. A micrometer adjustment of the dogs can be obtained by slightly turning the worms along the rack cut in the dog bar. Provision is also made for a quick rough adjustment by withdrawing the worms from the rack teeth so they are free to slide to the desired position.

Wheelheads of various sizes can be furnished, thus making it possible to use the proper size of spindle for each particular job. These wheelheads, being provided with a driving pulley giving the proper speed, are quickly interchangeable. They are driven by a flexible idler mounted on ball bearings and are arranged with a spring belt tightener which assures 70 per cent. belt wrap. Belt stretch is compensated for by means of a convenient horizontal adjustment.

A wheel guard covers the wheel as soon as it leaves the

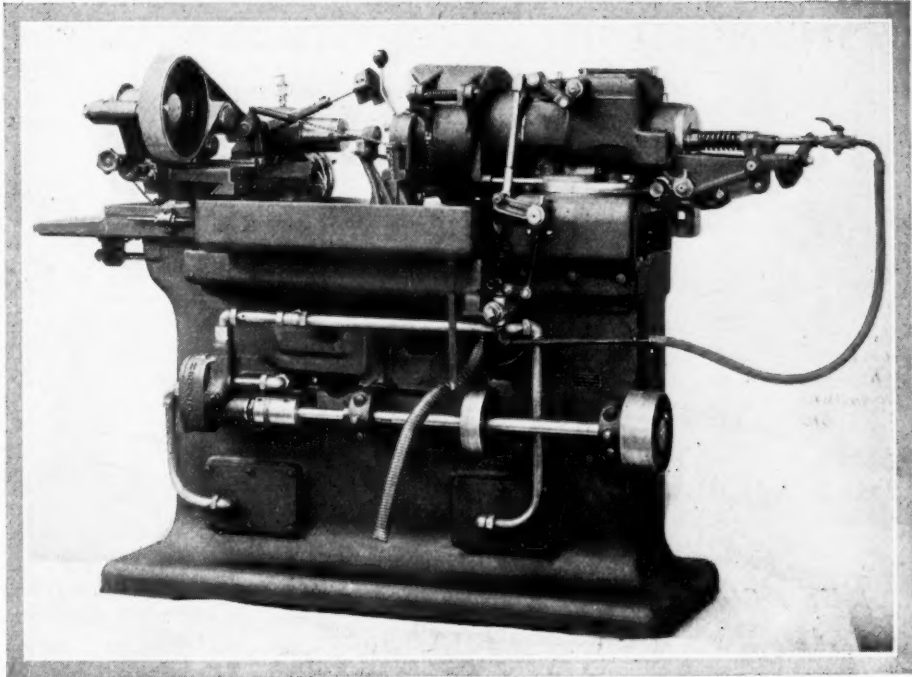


Fig. 2—Rear view of grinder

work; it swings downwardly and can be adjusted for various lengths of spindle. It fully protects the operator and does not interfere with the holding fixtures or the work-head guard.

The base is heavily ribbed and has the oil reservoir completely enclosed in its lower part. This keeps dirt out of the oil and at the same time adds to the rigidity of the machine. The rear shaft, which drives the gear-type oil and water pump, is mounted on ball bearings. Practically all of the oil piping, which consists of brass tubing, is in plain sight and readily accessible.

This machine will swing 15 in. and grind a hole 6 in. in diameter by 6 in. deep. The swing inside the standard water guard is 12 in. There are five work speeds, namely 119, 175, 312, 350 and 475 r.p.m. The complete machine weighs 550 lb. and occupies 50 by 96 in. of floor space.

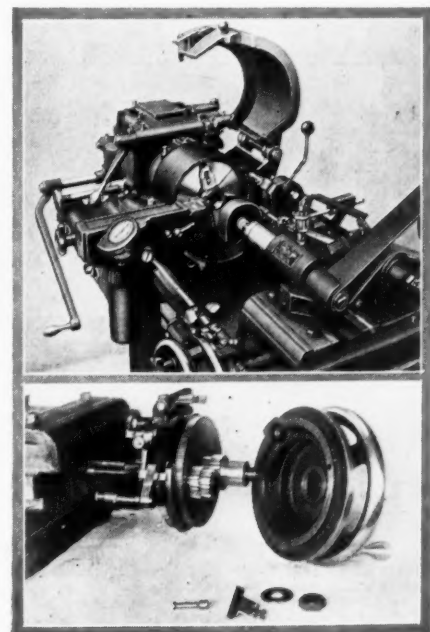


Fig. 3 (above) — Close-up view of shell dresser, automatic size indicator and aluminum cover over workhead. Fig. 4 (below) — Planetary gear assembly used for the automatic feed

Strength and Lightness Combined in Duralyte

EXTERIOR view of a finished bus body of Duralyte construction. This material is a heat-treated aluminum alloy and is claimed to combine the advantages of light weight and durability. The job as shown here is mounted on a Mack bus chassis



Bus Body Designed to Carry 30 People Weighs 4,000 Lbs.

BRAUN SPECIALTIES, INC., of Los Angeles, has produced a bus body of a heat treated aluminum alloy called "Duralyte." The metal is said to be similar in all essentials to duralumin, and this is claimed to be the first bus body of this material built in this country.

The many angles, I-beams and miscellaneous shapes incorporated in the body are made from annealed sheet and bar stock. After the required shapes are formed from the soft metal they are heat treated. The rivets are driven while hot. Duralyte weighs approximately one-third as much as steel of equal bulk and is said to have practically equal strength. The sides and roof of the bus body are made of 12 gage, the structural parts of 10 and 12, and the floor of 6 gage material. Tests made are said to have demonstrated that a body panel may be subjected to a heavy blow without denting.

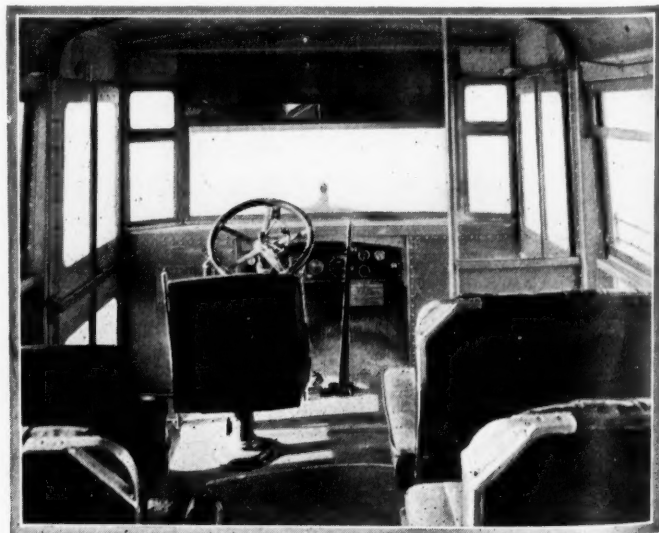
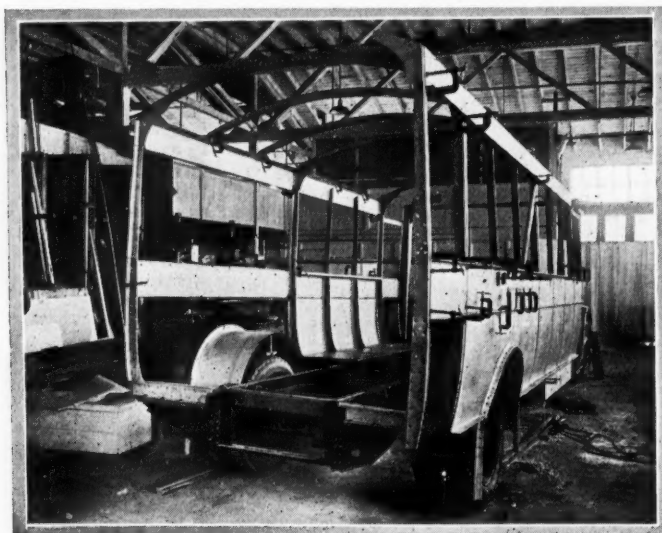
The experimental body is of the 30-passenger street car type. It weighs, fully equipped with seats and all accessories, about 4000 lb., but the designers claim it could be lightened several hundred pounds without the strength being affected. Nine steel outriggers were used on each side, and at least four of these could be dispensed with.

The weight could be further reduced by making the spare tire carrier and bumper supports of duralyte instead of iron.

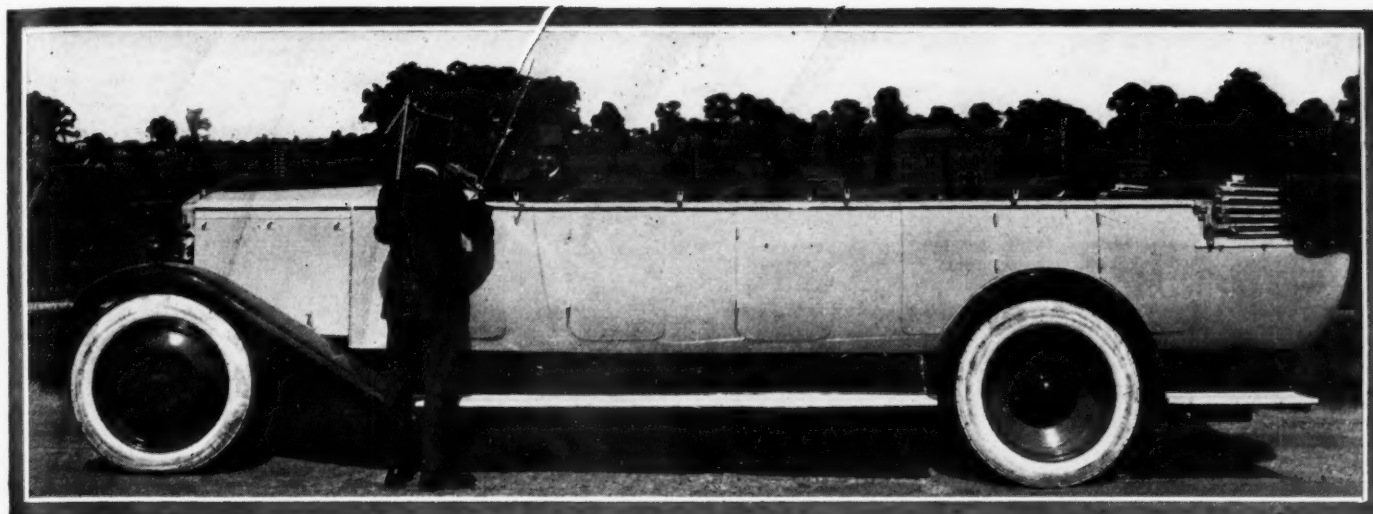
Road tests are said to have shown that the body is almost wholly free of rumble or drum and as quiet as a wooden body. Squeaks and rattles were guarded against by the use of rubber pads between the outriggers and the cross sills. No trouble has been experienced from excessive heat inside the body on hot days.

It is claimed for the body that it is fireproof and danger proof in that it affords the maximum possible protection against damage by collision, considering its light weight. The body is constructed on the unit principle. Any panel, filler, roof or floor piece can be taken out and replaced individually.

The bus has an auxiliary safety door to the left of the driver which is opened by a swinging bar. There is a full width emergency door in the rear. Several new ideas are incorporated in the heating and ventilation. The exhaust pipe passes through 6-in. tubular chambers beneath the body on both sides, from which outlets lead through the floor under the seats. Ventilators are located on both sides of the hood to admit air from above the line of road dust. After this air is heated it enters the body through the outlets and is expelled through a vented panel in the roof, which also carries the roof lights. The experimental body is mounted on a standard Mack bus chassis.



The picture at the left shows the framework of the Duralyte body, with most of the lower panel sections in place. Right—Interior view of Duralyte body



180-in. wheelbase Maudslay chassis with 20-passenger coach body

New British Low Level Bus Chassis Has Servo Front Brakes

*Transmission brake used as servo device is effective in
both directions and compensates brake effort
between front and rear wheels.*

By M. W. Bourdon

THE first British truck and bus manufacturer to produce a special chassis for bus and coach service alone, with a low level frame and four-wheel braking, whereas hitherto all British buses and coaches (apart from London buses) have had chassis designed for use as trucks but adapted—with lengthened wheelbase and high gear ratios in some cases—for passenger work.

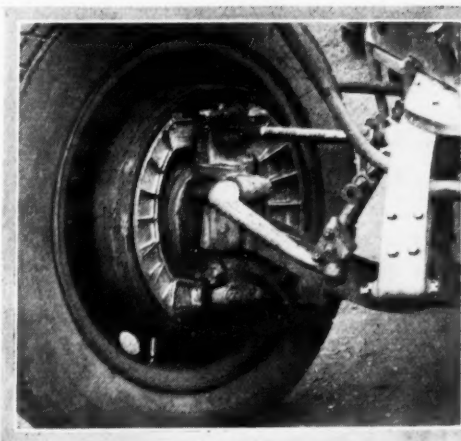
This firm has just introduced a range of chassis solely for passenger work as distinct from goods-carrying, whereas hitherto all British buses and coaches (apart from London buses) have had chassis designed for use as trucks but adapted—with lengthened wheelbase and high gear ratios in some cases—for passenger work.

This new range is notable in being also the first British bus chassis designed exclusively for pneumatic tires, and its manufacturers have had in mind throughout the recommendations of a Government Committee, which has suggested that all vehicles of this type should have a maximum unladen weight of $3\frac{3}{4}$ long tons. The result is that the longest wheelbase model will have a chassis weight of approximately $2\frac{1}{2}$ tons (5600 lb.).

The chassis has several features of engineering interest that represent departures from the orthodox. There is, for example, the way in which the transmission brake is made to function also as a servo device for the front brakes; then, too, the use of a rolled steel frame of H-section with tapered front dumb-irons, a sweep up over the rear axle and a wider rear than front end are believed to be unique. The first of those peculiar features is secured as follows:

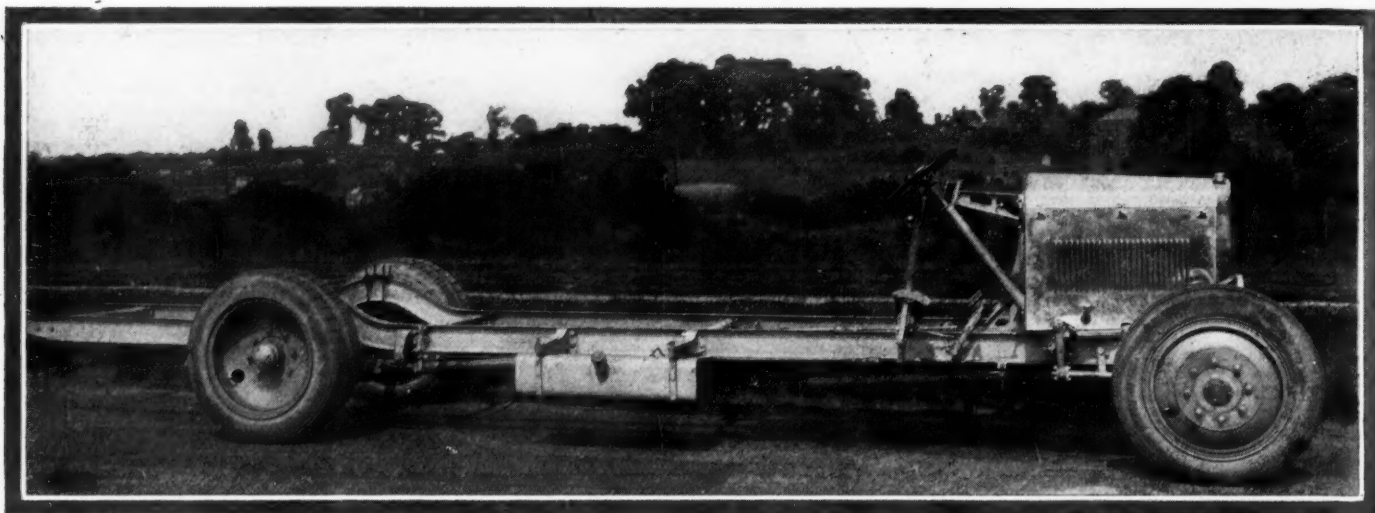
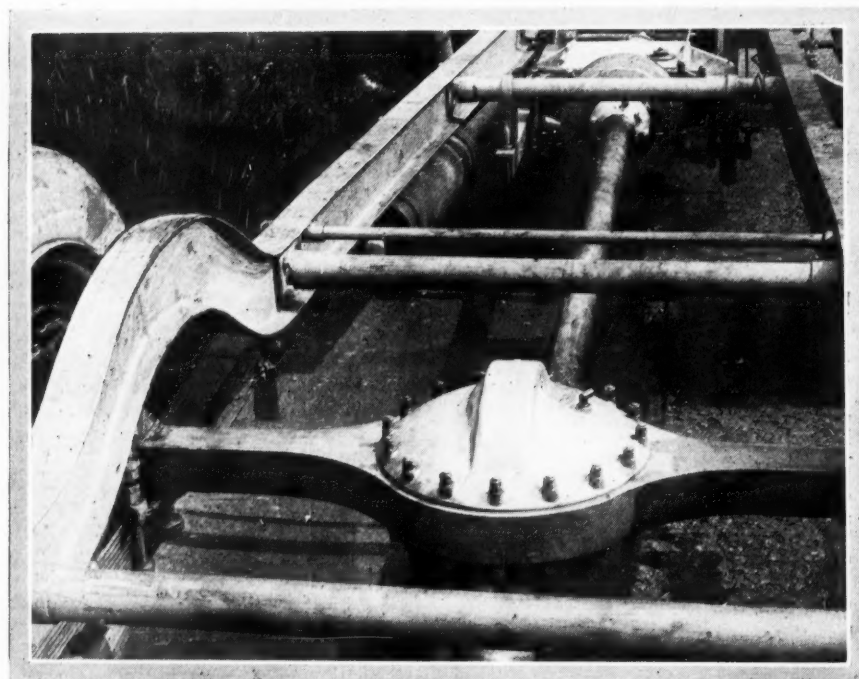
The transmission brake behind the gearset (the latter approximately midway in the length of the chassis) is of the expanding type, operated by pedal. Both its fulcrum

Maudslay bus
front wheel
brake



pins and its camshaft are, however, supported by a floating double-banjo type of flanger casting, the center of which is free to rotate on an extension of the gear casing; thus, when the brake is applied, the flanged casting or anchor-plate tends to move rotationally in the same direction as the brake drum.

This movement is utilized to rotate, within limitations, short sleeves running transversely under the brake, one at each side, coupled to the anchor-plate by suitable links. These sleeves are mounted on a shaft which, at its center, has a double-ended dog clutch keyed to it and engaging with dog teeth formed on the adjacent faces of the sleeves. At the ends of the shaft are levers coupled to the front brakes.

*The Maudslay bus chassis**Rear axle of Maudslay bus chassis*

The teeth of the dog clutches, it is important to note, are so dimensioned as to permit of a considerable degree of free relative movement between the units of each pair, with the result that, when the vehicle is moving forward, the application of the transmission brake, causing the anchor-plate to rotate partially or rock, takes effect upon the front brakes through one pair of dogs only, the other pair, on the sleeve coupled to the opposite end of the plate, moving idly in relation to one another. This second pair of dogs comes into effect only when the car is moved or tending to move backward, in which event the first pair is idle. In other words, no matter which way the vehicle or brake drum is moving, the movement of the inner shaft and the levers at its end is always the same.

As usual, the maximum range of the last-mentioned levers is approximately 90 degrees, and to insure that both sets of dog clutches shall never come into effect together, so opposing one another, the freedom of movement permitted to the jaws is approximately 150 degrees.

The double-ended dog on the inner shaft is keyed to the center and, as mentioned, has the front brake operating levers attached to the shaft extremities; thus the torsion of this cross-shaft at each side is equal, resulting in equality of effort being transmitted to both front brakes. Another point of note is that this use of the transmission brake as a servo device provides automatic compensation between front and rear wheel braking.

The front brakes are of the Perrot type, insofar as they are actuated by a universally jointed shaft supported at one end by the chassis frame. The cam-shaft at each side is, however, carried in a long single bearing located in a bracket which is flange-bolted to the top half of the jaw-ended swivel axle. A separate anchor pin is provided for each shoe and passes through a lower extension of the swivel axle jaw. The shoes are of cast aluminum, webbed for stiffness and cooling. The front axle is of H-section between the spring pads and of tapering round section thence to the knuckle ends.

Of 18 in. effective diameter and 3 in. in width, the front brake shoes are interchangeable with those of the rear wheels, the latter being operated alone by the hand lever through the medium of cables, while the front brakes have coupling rods running to and from levers on an intermediate shaft to bring them from the inside to the outside of the frame. Both front and rear wheel brakes are unclosed, while the drum of the transmission brake is ribbed for cooling purposes. All five sets of shoes have independent finger adjustments, there being no balancing device between the front or rear pairs.

The frame, as already mentioned, is made up of rolled steel side members of H-section, with the single web vertical. Two sizes of stock are used, 5 x 3 in. for the shorter wheelbase models and 6 x 3 in. for the longer chassis, the section being 3/16 in. in both cases. The tapering of the front ends of the side members to form the integral curved dumb-irons already referred to is attained by cutting out tapered sections of the vertical web, compressing the extremities together and welding

the separated portions of the vertical web. Alongside the rear end of the engine the frame is curved outwardly, the members being brought parallel again just in front of the rear springs, resulting in the front end of the frame being 36 in. wide and the rear end 42 in. in width. The kick-up over the rear axle is formed subsequent to the rolling process.

Five tubular cross-members are fitted, each of 2½ in. in diameter. Engine and gearset are carried on a sub-frame, which, at the rear end, is hung on brackets from one of the cross-members. Here it may be mentioned that no rivets are used at any point in the chassis construction, or in the locating of brackets for the various components; machined bolts with castellated nuts and split pins are used, passing through reamed holes.

The frame level of the loaded vehicle is considerably lower than that of any other British bus or coach chassis, apart from that of the N.S. type London bus, for its height above the ground with 36 x 6 in. straight-sided pneumatic tires (twins at rear) is 24¾ in. This low level is not secured at the expense of ground clearance, nor by the use of any peculiar feature of construction in the transmission or elsewhere. The ground clearance is 8½ in. under the center of the back axle, which incloses direct and under-hung worm gearing; in front of that point the minimum clearance is 11 in. It should be noted that the rear springs are under-hung and, like those at the front, are practically flat when loaded.

This new chassis is being made in five different models with two engine sizes, and with the driver beside the engine in one case. The two engines used are of Maudslay design and production and do not vary in any material feature from those that have been used of recent years on truck and bus chassis of this make. They have an overhead camshaft, driven through a vertical shaft, inclosed in a tube and driven by bevel gearing. Water circulation is by pump, driven from one end of a transverse shaft at the front of the engine, the other end of which drives the magneto. The engine is lubricated by a full pressure system, which leads up to the wrist pins. A point of note is that the overhead valves have no clearance adjustment; the latter is set when each engine is tested, and it has been found that any wear that takes place tending to increase the clearance is counteracted by valve-grinding at normal intervals.

Normal Speed 2000 R.P.M.

With a bore and stroke of 100 x 130 mm. and 110 x 130 mm. respectively, the two engines have a normal speed of 2000 r.p.m., the smaller developing over 60 b.hp. and the larger one over 70 b.hp.

An inverted cone type fabric-faced clutch is used with a central spring, and a long coupling shaft with flexible disk joints runs back to the four-speed gearset, which has ratios of 5, 2.9, 1.73 and direct. Behind the gearset is a ball-bearing star type universal joint at the head of the tubular propeller shaft, which has a sliding type of joint at the rear. With the smaller engine the worm gear ratio is 7 to 1, while that used with the larger engine is 6 to 1.

The back axle consists of a double banjo forging, with the central ring horizontal, capped by an aluminum cover plate and supporting below the aluminum housing on the complete worm gear. The wheel bearings are of the roller type with ball thrusts, the rear springs are 54 in. long and 3 in. wide, the front springs are 40 in. long.

The steering is of the worm and complete worm wheel type with roller bearings and ball joints for the coupling rods. The pivot pins of the swivel axles are inclined so that their axes prolonged coincide with the points of tire contact with the ground.

The following are the five models now in production; they may be supplemented later by a double-deck model:

Type	Engine	Wheelbase	Chassis Price
Coach or Bus			
22 seated	24-60 hp.	180 in.	£825
26 seated	24-60 hp.	192 in.	£850
30 seated	24-60 hp.	200 in.	£875
30 seated	30-70 hp.	200 in.	£900
*35 seated	30-70 hp.	200 in.	£925

*Driver at the side of engine.

The track in all cases is 72 in., which is above the average of British practice hitherto.

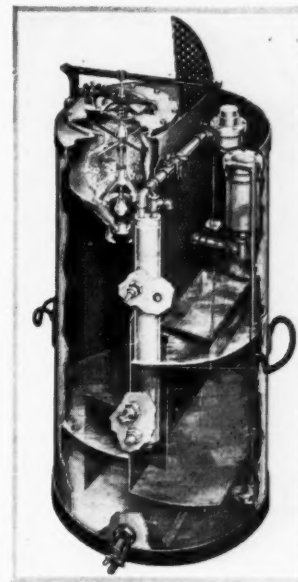
Portable Acetylene Generator

A SMALL generator for producing acetylene at low pressure for welding and cutting has recently been developed by the Oxweld Acetylene Company, 30 East Forty-second Street, New York. This supplements a line of larger generators, a great many of which are used to supply pipe lines in shops where much cutting and welding is done.

The new generator, which takes 35 lb. of carbide at one charge, can be transported readily from place to place, thus providing a portable supply of generated acetylene gas. Empty, the generator weighs only 210 lb.

An entirely new principle of feed control is used which might be called a "heavier-than-water" float. A vertical partition, extending nearly to the bottom into a water

Oxweld portable acetylene generator



seal, divides the generator shell. One side is gas tight and contains the carbide hopper at the top. The upper part of the other side contains gas regulating and protective devices, and an automatic carbide feed control. Generation of the first acetylene causes water to rise on this side of the partition high enough to all but submerge a pan full of water, hung to a control lever. This pan normally acts as a weight acting counter to a spring, but as the water rises about it, its apparent weight is diminished and the carbide hopper valve is closed by the action of the spring. As acetylene is drawn off, water rises in the gas compartment and correspondingly lowers under the float, relieves some of the buoyancy under the water pan, which, gathering weight with the receding water, depresses the spring and allows a small amount of carbide to drop into the generator, and restore equilibrium conditions.

Air Cleaner Combines Principles of Screen and Oily Surfaces

Air-Maze, device marketed by new company, claimed to offer negligible resistance to air flow and to eliminate all dust

A NEW air cleaner for internal combustion engines and similar purposes has been placed on the market by the Air-Maze Corporation of 587 Fifth Avenue, New York. Among those interested in the concern are Albert A. Schaaf and Martin V. Kelly, both well known in the automobile industry. The cleaner is the invention of a Cleveland engineer who has been using the same principle for cleaners for industrial installations, such as blast furnace plants, for several years.

As may be seen from the photographs reproduced herewith, the cleaner comprises a hollow cylinder of wire netting through which the air to be cleaned must pass. There are three layers of crimped netting and alternating with these are layers of flat netting. The netting is of only moderately fine mesh, and removal of the dust from the air is dependent mainly upon a coating of non-drying oil with which the netting is provided. The cleaner comes from the factory dipped in non-drying paraffin oil, and the principle of operation is therefore that of the oil type of air cleaner, the dust adhering to the oil covered wires.

The cylinder of netting (or the screen), with one head of pressed steel secured to it, is clamped to the base or support, which is connected directly to the carbureter air intake. Two clips of spring steel are hinged to the sup-

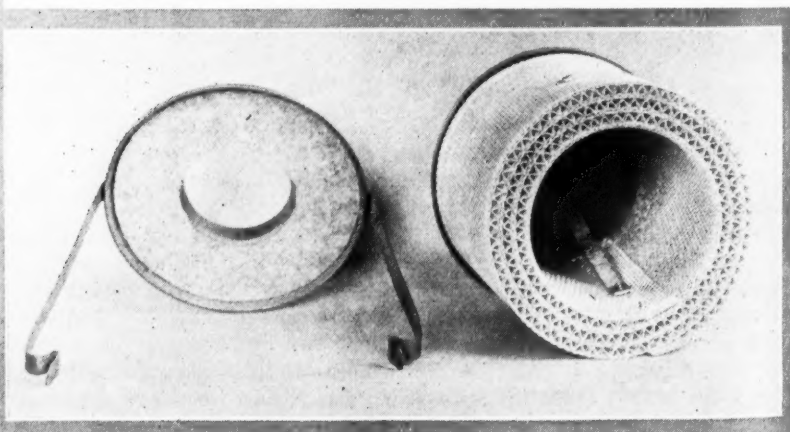
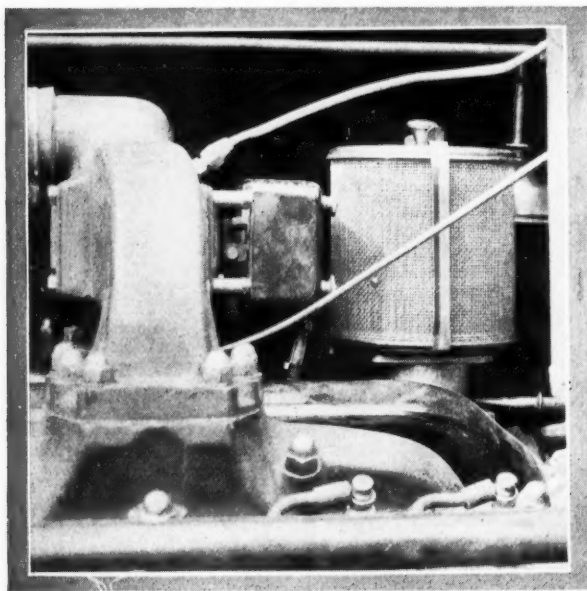
quite an advantage for automobile use, as bulky engine accessories not only are unsightly but tend to interfere with access to the engine.

It is claimed for the Air-Maze that it removes almost 100 per cent of the dust contained in the air and thus eliminates the wear due to the abrasive material in the dust. The dust adheres to the wires of the netting, chiefly to the outer layer. Owing to the fact that the speed of the air through the openings of the netting is low, the dust will not become attached very firmly, and a large proportion of it is said to be shaken off by the vibration of the engine. Thus the cleaner is to a certain extent self-cleaning.

However, the manufacturers advise that the screen be taken off the engine and cleaned once or twice a year. Cleaning is effected by lightly tapping the device against a tire. Of course, if the owner desires, he can take off all of the old oil and the dust adhering to it by dipping the screen in gasoline, but this is said not to be necessary to satisfactory operation. It will be noticed that the pressed steel head to which the screen is secured is provided with a central knob by means of which it can be readily handled. After it has been cleaned the screen is dipped in stale crankcase oil.

Since there are no moving parts to the device there is nothing to wear out, and its life is undoubtedly equal to that of the car on which it is mounted.

The Air-Maze air filter installed on engine and taken apart to show construction



port and hold the filter in place in such a manner that it can be readily removed for cleaning.

Among the claims made for this air cleaner is that it offers practically no resistance to the flow of air to the carbureter and therefore does not cut down the maximum power of which the engine is capable. This is due to the fact that the air enters over the whole cylindrical surface, and the aggregate area of the openings is quite large, although the overall dimensions of the cleaner are small. The automobile size has a diameter of about 5 in. and about the same length. This compact form, of course, is

THE most striking increase shown for women in any industrial group in the last decade is that for operatives in automobile factories, according to the *New York Times*. In ten years they have increased 1408 per cent. Many of the changes which have taken place in manufacturing and mechanical industries were indicative of changes within the industries themselves and showed increases for men also, but it is significant to find that while women operatives increased almost 1500 per cent, men operatives in automobile factories increased only 435.4 per cent.

Just Among Ourselves

Car Announcements Fit with Sales Policy

NEW model announcements this year are of such a character and are being so timed as to fit in with the merchandising situation better than ever before. Several more companies have discontinued the policy of yearly models for one thing, while slight alterations in other lines are not being heralded as completely new designs. Changes are being made in almost every line, as is natural, but they are being announced without the ballyhoo which tends to obsolete all other previous models. Entirely new cars are being brought out by several makers in addition to those already announced. At least three light sixes and one light eight are to be expected before the first of September. New body designs are scheduled to appear in some lines.

Cash Sales Increase—Why?

IN the midst of unusually liberal time sales terms, small down payments and long credit extensions, it is a bit surprising to get reports from many sections that cash sales constitute a larger proportion of the total this year than for some time past. The reverse might be expected under present conditions. Hare and Chase, noting this condition in a recent news bulletin to car dealers, explains it by saying "It would appear that the cash market is absorbing available deliveries of the types most in demand and that the time buyer—the mainstay of the business over the long swing—is not being cultivated as he must be if future volume is to be maintained." Isn't it possible that the explanation lies partly, however, in the fact that more buyers are beginning to recognize more fully the actual cost of buying cars on

extremely "liberal" terms? When the down payment is meager and the time allowed very long, the financing charge necessarily is high. Time payments are thoroughly sound fundamentally, but it is impossible to extend terms so liberal and thus run up rates so high as to make them uneconomical from the standpoint of the buyer. Increases in cash payments in many sections of the country make this phase of the question worth thinking about.

Dealer Price Cut Protection—Add Chevrolet

PRETTY soon we'll be able to report that the practice of protecting dealers on price cuts is general throughout the industry. Having previously reported Studebaker, Packard, Hupmobile, Franklin and Nash, we now add Chevrolet to the list. "Chevrolet has for several years past protected dealers from any loss by reason of price reduction," writes Assistant Sales Manager C. E. Dawson, "in fact we have a clause in our contract which covers this situation." That makes the total six.

Story of the First Quarter Production Figures

STUDY of details of the first quarter production figures as usual tell an interesting story—and a story a bit different from that of the general totals. As is generally known, passenger car production in the first quarter of 1924 exceeded that of the first three months of 1925 by a little over 196,000. This loss has been attributed to the fact that manufacturers this year were holding production in line with sales and that in 1924 they had overloaded dealers. True, they did hold production in line with sales, but that didn't

mean decreased production in a good many cases. Fifteen companies, most of them important ones, had a greater output the first quarter of 1925 than in the first quarter of 1924. Four other companies dropped below last year only slightly. The rest of the list, of course, made up the losses, but two big production companies alone accounted for a decline of about 250,000. Eliminating those two from the list, production for the first quarter of 1925 would have been ahead of 1924.

These figures would seem to indicate that cars have sold well in many lines ever since the beginning of the year and that, so far as those lines at least are concerned, the big sales of the second quarter were not the result of piled up demand. When spring came and demand actually expanded, however, other makers as well began to get more business. As demand slackens in the third quarter an uneven stepping down may be expected, just as the stepping up process was not equal all along the line.

Riding Comfort Research Goes On

HOW we do slip sometimes! After listening to F. C. Mock's interesting paper on spring suspensions at the summer S.A.E. meeting, we printed a picture of Mr. Mock and credited him to the General Motor Research Corp. That was all wrong, of course. Mr. Mock is research engineer for the Stromberg Motor Devices Co. Now that's corrected. Those who saw Mr. Mock perform his experiments at White Sulphur will be interested to know that his paper there was merely a preliminary report, preceding a very considerable program of riding comfort research which he is now engaged in. N. G. S.

Wide Market for Tractors in South; Sales Show Constant Gain

Demand This Year 50 Per Cent Heavier Than 1924. Farmer Is Sold on Power Equipment. Many Industries Buying. Lumber Men Best Customers.

By HAROLD F. PODHASKI

DURING the month of March, 1925, power farming equipment sales in the Southeastern States were slightly more than 50 per cent larger than in March, 1924.

During the month of April, 1925, power farming equipment sales in this same territory were slightly less than 65 per cent larger than in April, 1924.

During May, 1925, the increase over the corresponding month of last year was substantially the same as in April.

The June increase, although definite tabulations are not at this writing available, shows another remarkable gain over the same month of last year.

These figures, taken from the records of the Federal Reserve Bank of Atlanta, as furnished to the bank by the seven largest distributors of tractors and power farming equipment in this territory, are unquestionably reliable, and are presented here that some tangible idea may be given as regards the healthy tone of this business in the South, and from which may be formed a more or less accurate conception as to what the future holds in store for this branch of the automotive industry.

In spite of these remarkable gains, in spite of the fact that the first half of 1925 has witnessed an increase in power equipment sales in the Southeast of approximately 50 per cent over the first six months of 1924, in spite of the fact that 1925 will unquestionably prove the greatest year by far in the history of this industry in the South, the development of this field has really just begun.

Industrial Market Grows

While the agricultural industry in the South has increased its use of tractors considerably within the past six months, and will undoubtedly continue to buy on a very heavy scale for some years to come, it is really the remarkable expansion of the industrial market for tractors during the past year or so that has contributed most to the substantial sales gains.

While the industrial uses to which the average tractor may be put are doubtless many and varied, there are certain of these uses that combine to create the more important of the industrial markets that will consume, perhaps, about 90 to 95 per cent of the tractors sold in this market. And these primary markets may be outlined as follows:

1. Lumber manufacturers
2. Road building contractors and State highway departments



Clearing a 4000-acre site for a reservoir at Bartletts Ferry, Ga.

3. Miscellaneous industrial concerns who use the tractor for hauling purposes in factory yards, usually with trailers; also for auxiliary belt power, etc.
4. Cotton ginning companies
5. General building contractors
6. Public utility concerns
7. Municipalities
8. Ship loading and unloading companies at port cities of the South Atlantic and Gulf coast
9. Mining companies for use as a locomotive attachment in mines

Of the above markets the first three named are the largest buyers, and are given here in the order of their importance.

Lumber manufacturers find many uses for the tractor in the Southern territory, but use it primarily for "snaking" heavy logs out of the timber tracts where formerly horses and mules were used, or as a locomotive attachment to logging trains. It is also extensively used for belt power in the smaller sawmills, and is very frequently put to this same use by Southern farmers, many

of whom, if there is timber on or adjacent to their properties, cut rough lumber in a small way.

By road building contractors and State highway departments the tractor is most extensively used for grading purposes, also for belt power to operate concrete mixing machines, and for breaking and putting in cement work and road beds. Here, in fact, the tractor has now almost entirely superseded the horse and mule in the Southern field, and to this branch of industry tractor sales the past two years have therefore been exceptionally heavy, as the South is carrying out more new road construction than ever before in its history. The future of this market also is exceptionally bright, as here is one buyer at least who has now been fully educated to the use of the tractor, and with whom little or no preliminary work of this nature is necessary. And the same is true, too, of a majority of the larger building contractors, who use the tractor for grading and foundation digging purposes.

The third primary buyer in the South—miscellaneous industry—represents another market that is developing very rapidly, and that will unquestionably be a very heavy

buyer of tractors during the next few years. While some preliminary educational work still is necessary in dealing with a majority of those who do the buying in this field, within the past year or so there have been so many sales of this nature that the education is easily enough provided by pointing out the successful experiences of other concerns in the same field.

Take, for instance, some given community in which there may be located a fairly large number of factories. The difficulty in the preliminary opening up of this market lies in the closing of the initial sales to the first one or two companies. But when this has been done, and the tractor has thus been given an opportunity of proving its worth, its money and time saving qualities, sales create sales and the others begin to fall rapidly in line until a majority of the factories in that community that may have any use at all for the tractor will be numbered among its users. This has been the experience in many industrial communities in the South, but in spite of this the market is as yet only opening up.

The other six of the principal Southern markets given above are important enough in a way, but they are not yet buying on any basis that may be compared with the first three named. For in these fields the selling problem is still very largely one of education, necessitating much preliminary work before the actual sale can be successfully closed. Yet all these markets are developing at a satisfactory rate, and within the next few years they will be fairly heavy buyers of tractors. Particularly is this true of the public utility concerns, which are buying tractors now in quite large quantities.

One of the most unusual of these Southern markets, and one, too, that is fast growing in importance, is that listed as No. 8. At the principal Southern port cities like Savannah, Jacksonville, Mobile,



Above—A tractor is used for belt power to cut lumber on a Southern farm. At right—One of the many tractors which are helping in the construction of good roads through the South



New Orleans, etc., the tractor is being extensively used in the loading and unloading of ships. The storage capacity of almost any ship doing an oceanic business is naturally large, and a tractor hoisted into the interior of the ship to drag the freight to a point where it may easily be hoisted out can do more work, and do it at much less cost, than a dozen husky stevedores. And the same is true, of course, in putting the freight into the ship, in both cases the tractor being used inside the ship and on the docks, taking the place of many men.

This market, too, is a fast growing one, and in the future will be even more important than at present, due



New uses for tractors are being found every day. In this picture the tractor is operating in the hold of a coal vessel which is unloading at the docks of Savannah. A scraper is fitted to the front of the tractor, the coal is scraped and pushed into a pile directly under the hatch, and the big scoop does the rest.

to the action recently of the United States Shipping Board in removing the discriminations that existed so long against the Southern ports and putting them on a basis of parity with those of the North Atlantic coast. This decision will have the result of materially increasing the export and import business through Southern ports, and automatically, of course, this will serve to create a broader market for the tractor to replace stevedore labor.

A comparatively new use of the tractor in the South, and one that has developed into some importance within the past year, is its use as a locomotive attachment in mines. It had been used for this purpose by lumber companies for some time in connection with logging trains, but not until about a year ago did the mining companies of the South begin to turn to it. Now there are many of them, in the coal mining districts particularly, which are using tractors for this purpose, and the result is that another important industrial market is being created that will doubtless buy a considerable number of tractors within the next few years.

Regarding the tractor market in the South as a whole, however, the agricultural market still remains considerably the most important, though the industrial market, as has previously been stated, is developing at a very rapid pace. Right at present the average sales of tractors are about 65 per cent to farmers, and about 35 per cent to industries. A year ago at this time the sales to farmers were around 75 or 80 per cent of the whole, and to industries around 20 to 25 per cent of the whole. This would seem to indicate that agricultural demand is drop-

ping off, but if you will refer again to the total sales gains made this year as outlined at the beginning of this article you will see that they have been sufficiently large to indicate that there has been a substantial increase in both the agricultural and industrial sales.

It is due to the fact that industry is turning so rapidly to the use of the tractor in the South that its percentage of gain as compared with agriculture is increasing, not that the agricultural sales are falling off.

In selling to industrial concerns in the South the average number of time sales as compared with the total sales is about 65 to 75 per cent, with 25 to 35 per cent cash purchases. The terms are ordinarily short, but in dealing with some industries, particularly smaller lumber mills, almost as liberal terms may have to be given as when dealing with farmers. As is the case when selling motor trucks to this industry, it is sometimes necessary that the manufacturer be prepared to "nurse" the companies along, letting the tractors pay for themselves in the work they do and the money they save.

The percentage of sales to farmers on time is about 90, and about 10 per cent cash. Ordinarily the initial payment will represent about one-half of the total cost of the tractor, the balance to be paid when the next crop is gathered and sold. And though these terms are sometimes rather long, particularly if the sale is made during the spring, a majority of Southern bankers are only too glad to accept such paper, for experience has long since taught them that the tractor means prosperity to the farmers of their community. There are, however, some bankers who are exceptions to this rule, and will not accept such paper. In that event one of the financing companies is necessary, though distributors and dealers find it advisable to use the banks wherever possible in order that the money might be kept in their community.

It is also of interest to note that financial conditions are always better, and tractor sales much more easily made, in sections where farmers practice crop diversification. A really good evidence of this is noted in Tennessee. Tractor sales in West Tennessee have always been comparatively poor, due to the fact that the farmers in this district adhere very largely to the one crop policy, growing little else besides cotton. On the other hand, tractor sales in East Tennessee have always been very good, as the farmers in that section practice crop diversification more widely than they do in any other part of the South. The amount of tractor business in that part of the State, in fact, is so heavy that it offsets the poor business in the Western part of the State and gives Tennessee third place among all the Southern states as a tractor market so far as agricultural buying is concerned.



A tractor and stump puller demonstration at the Georgia State Fair

The leading tractor buyer is Georgia and the second largest Alabama.

It was during 1920 and 1921 that the tractor market in the South first began to assume any importance. From then until 1923 the development was slow and gradual, due to the fact that farmers had never been educated to the use of tractors and that money was very tight because of the widespread practice of the one crop policy. Much preliminary work was essential in those days before tractors could be sold, therefore the volume of business done during 1921, 1922 and 1923, though each year showed fairly substantial gains over the year before, was not exceptionally large. By the end of 1923, however, so many tractors had been placed on Southern farms that the farmer had become familiar with the money and time saving qualities of the device and therefore sales during 1924 showed a considerable gain.

Education Still Essential

Education, however, is still a very essential factor. This education is being carried out by tractor shows in various communities; by the holding of tractor schools for the farmers under dealer direction, with expert salesmen and repairmen in charge; by the showing of motion pictures which cover every feature of tractor operation, maintenance and repair; and by agricultural and industrial demonstrations to groups of prospective buyers.

The latter phase of it—demonstrations—is the most important of the educational features. Here the tractor is put through all of its paces, and with his own eyes the farmer sees what it can do, what work it will save him, what money it will save him, etc.

At present the average number of demonstrations necessary before the sale is finally closed is seven.

There is every promise of a splendid cotton crop in the South this year—one of the largest in some seasons—

THE tractor survey presented here completes a series of four articles by Mr. Podhaski on the South as a market for automotive vehicles.

In the first article, published March 19, the general business outlook in the South was discussed and registration figures compared to show the rapid increase in motor vehicles in that section in the past two years, as well as the potentiality of the market that still exists. The growth of bus operation and the market for bus sales were treated in the issue of May 28. The situation as regards truck sales was similarly outlined in the issue of July 2.

The South, due to economic conditions, has lagged behind the rest of the country in the use of motor transportation, but in the last few years a great change has taken place, commerce and industry have been developed as never before, and with this re-awakening and return of prosperity has come an unprecedented opportunity for the automotive salesman to expand his business in what is almost virgin territory—the last big market to be conquered in America.

with a stable price and, as business in this section closely follows the trend of cotton, there is sure to be a continuation of good business for an indefinite period and an ever-growing demand for tractors in both the industrial and the agricultural markets.

A Balloon Tire That Dates Back 30 Years



IN connection with the history of the balloon tire the accompanying photograph, reproduced from Vol. I, No. 1, of *The Horseless Age*, published Nov. 1, 1895, is of interest.

It shows a vehicle built by J. B. West, a manufacturer of (steel) tire setting machines in Rochester, N. Y. According to the description in *The Horseless Age* the rear wheels were 30 in. in diameter and were fitted with 6 1/4 in. Dunlop tires.

It has been said that the first balloon tires were fitted to a car belonging to the King of England, but at the early period when this photograph was published the royal household did not as yet boast of a horseless vehicle.

Automatic Shift is Applicable to any Three-Speed Gearbox

Gear pre-selected by means of convenient lever on steering post under wheel and actual shifting is effected automatically through operation of clutch pedal. Housing containing mechanism bolts to top of gearbox.

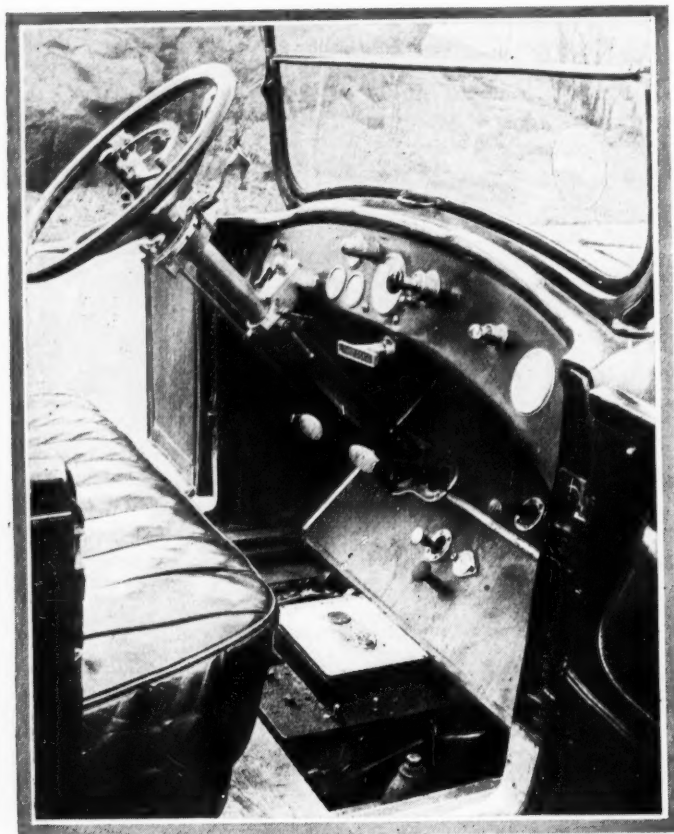


Fig. 1—Hasbrouck automatic gear shift shown fitted to a car

AN automatic gearshift of the type by which the driver selects the gear to which he wants to shift in advance, by means of a selecting lever, and the actual shifting is effected by depression of the clutch pedal, has been developed by the Hasbrouck Gear Shift Corp., with offices at 152 West Forty-second Street, New York City.

In the design of the latest model of this device, universality of application has been one of the chief objects in view. The Hasbrouck Company realizes that in order to interest the car manufacturer it must first "sell" the motoring public on its product, and in order to facilitate the fitting of the device to different makes of car at service stations it has been so designed that it will go on any car of the three-speed selected type and require a minimum amount of work in fitting.

The selecting lever moves on a quadrant clamped to the steering post immediately below the steering wheel, and the shaft of this lever is located back of the steering post and extends parallel with it to a point below the toeboard, as shown in the photograph herewith.

All of the selecting and shifting mechanism is assembled

in a cast housing which is bolted to the top of the transmission case, over the opening in the latter, which is usually closed by the plate carrying the support for the gear shift lever. Several views of this assembly are shown in Fig. 2.

From the left side of the housing there extend two shafts, a selector shaft *A* and a shifting shaft *B*. Both of these shafts carry downwardly extending levers, the lever on the selector shaft being linked to a lever at the lower end of the shaft of the selector lever on the steering post, and the lever on the shifting shaft to a point on the clutch pedal above its fulcrum.

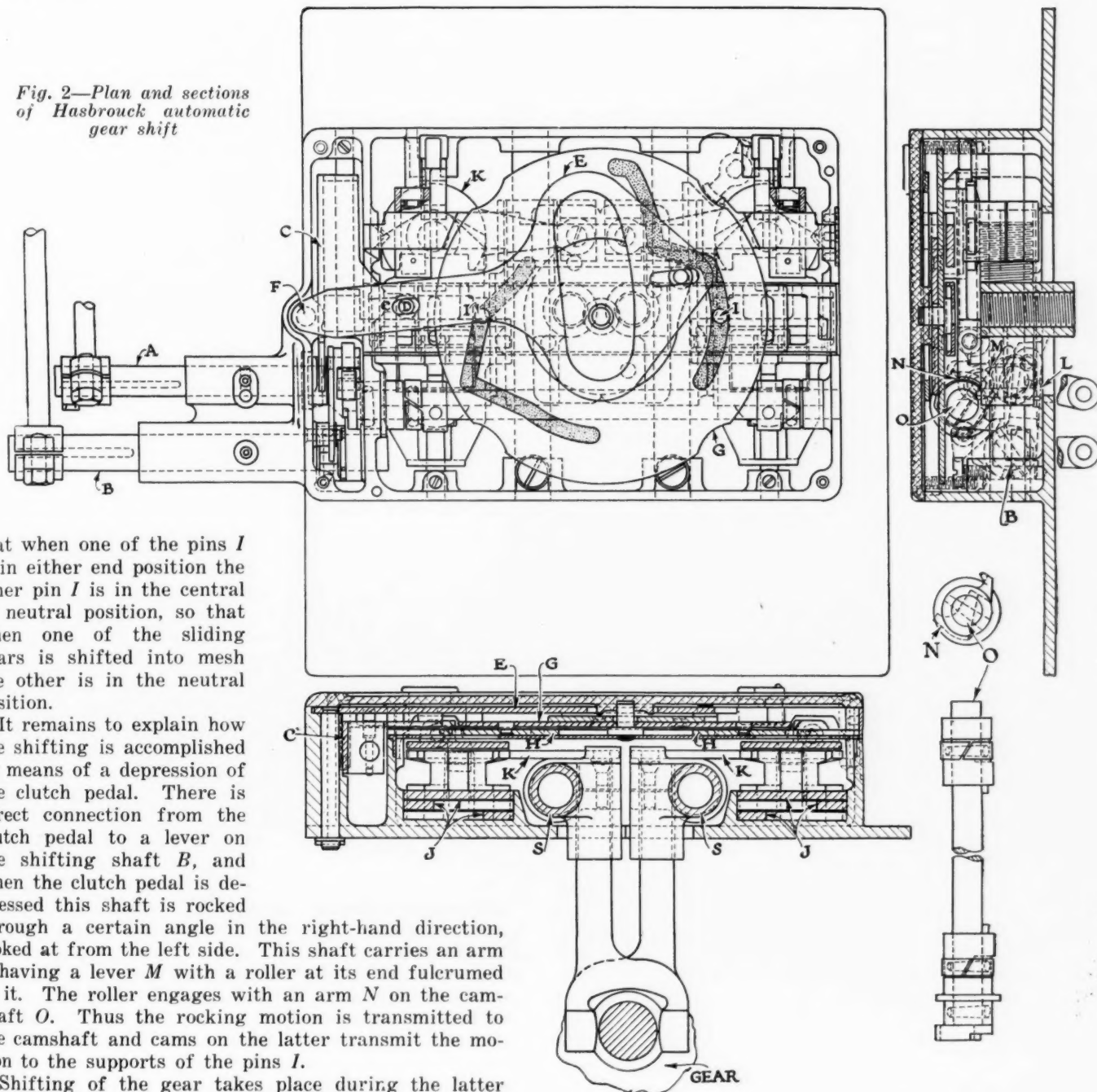
Inside the housing the selector shaft carries a small crank the pin of which engages into a slot on a sliding member *C*, which is capable of motion in the fore-and-aft direction in a guide. This sliding member is provided with a laterally extending arm *c* in which there is an oblong hole through which extends a pin *D* in the swinging lever *E*, which is fulcrumed at *F*. The free end of this lever is sector-shaped and has a large oblong hole formed in it so as to clear certain parts which extend above the level of the lever.

Radial Slot in Lever

This swinging lever *E* has in it a radial slot through which extends a pin *d* fastened into the rocking disk *G*, so that when lever *E* is swung about its fulcrum by the operation of the selecting lever on the steering post, disk *G* is simultaneously swung around its axis.

Disk *G* has two cam slots cut in it, which are stippled in the drawing. In each of these cam slots there is a pin which is fastened into a member *H* which is capable of a transverse sliding motion. This member acts on a pin *I* extending through a slot in it. Pin *I* also passes through three members *J* capable of a sliding motion in the fore-and-aft direction, these three sliding members being located one above the other and separated by pieces of sheet metal. In each position the pin, when moved forward, engages one of the sliding members *J* and forces it forward, while the other two slides *J*, because of the form of the openings in them, are not affected. This forward motion of the sliding plates *J* moves the shifter arm *K*. As clearly shown in the detail view, Fig. 3, if the pin *I* is in the position toward the left when shifting takes place, the shifter lever *K* moves right-handedly around its pivot and the sliding sleeve *S* to which it is connected is shifted to the rear. If pin *I* is in the central position when shifting takes place, the sliding plate *J* will press against lever *K* centrally, in a line passing through its fulcrum, and this will bring the shifting lever *K* back to the central or neutral position. If the pin *I* is in the position to the right when the operator shifts, then lever *K* will be moved around its fulcrum in a counter-clockwise or left-handed direction and the sliding sleeve *S* will be moved forward. The two cam slots in plate *G* are so arranged

Fig. 2—Plan and sections of Hasbrouck automatic gear shift



that when one of the pins *I* is in either end position the other pin *I* is in the central or neutral position, so that when one of the sliding gears is shifted into mesh the other is in the neutral position.

It remains to explain how the shifting is accomplished by means of a depression of the clutch pedal. There is direct connection from the clutch pedal to a lever on the shifting shaft *B*, and when the clutch pedal is depressed this shaft is rocked through a certain angle in the right-hand direction, looked at from the left side. This shaft carries an arm *L* having a lever *M* with a roller at its end fulcrumed to it. The roller engages with an arm *N* on the camshaft *O*. Thus the rocking motion is transmitted to the camshaft and cams on the latter transmit the motion to the supports of the pins *I*.

Shifting of the gear takes place during the latter portion of the forward motion of the clutch pedal. When it is desired to coast, this can be done by depressing the pedal enough to disengage the clutch.

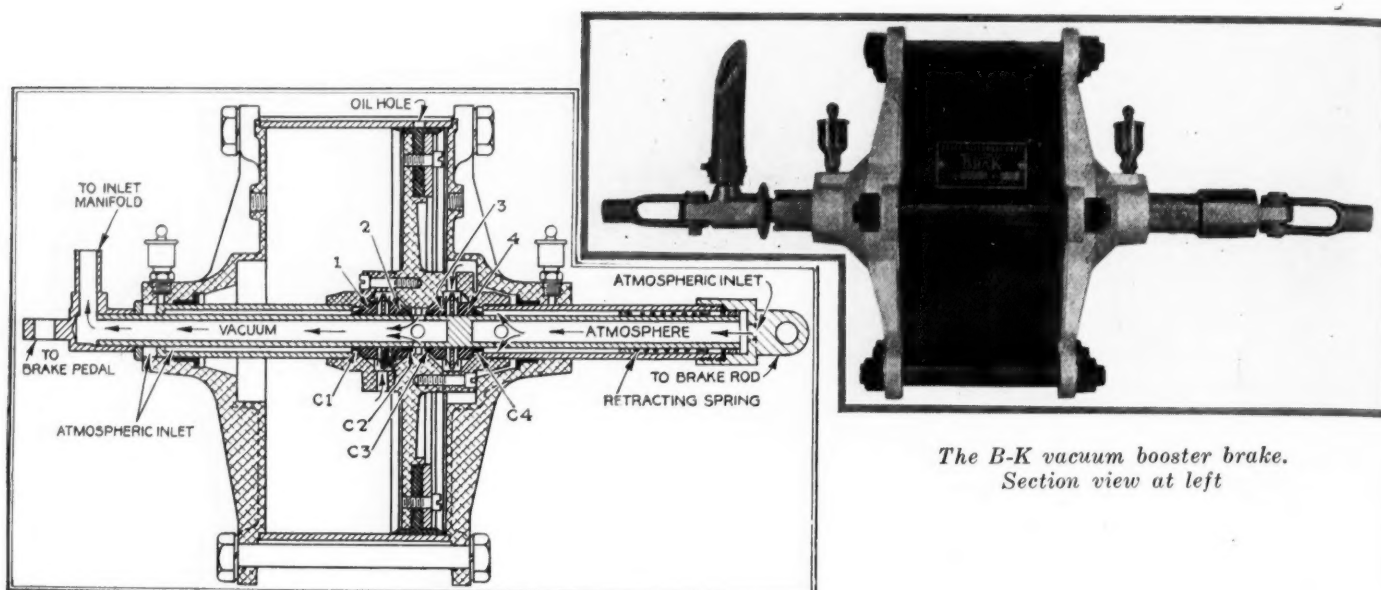
The chief advantages of this, as of any automatic gearshift, are that it eliminates manual gear shifting, hence the conventional gear lever can be removed from the front compartment, and if the emergency brake lever is re-

placed by a pullrod, the front compartment can be entirely freed of obstructing levers. With the automatic gearshift it is unnecessary to remove the hand from the steering wheel in making a shift, and the device should, therefore, add to the safety of driving in traffic.

Next Week—"Marketing in Europe"

THIS is an article for automotive equipment manufacturers. It is written by an American export manager just home from abroad and contains a number of valuable suggestions for equipment manufacturers who desire to take advantage of the favorable

opportunity which now exists to push European sales. Several new machine tools also will be described in this issue, as well as another automatic gearshift, and new car models representing three popular lines, which will furnish a good idea of styles in design for 1926.



The B-K vacuum booster brake.
Section view at left

B-K Booster Brake Utilizes Vacuum of Inlet Manifold

Supplies all of force needed in most applications and is assisted by pedal pressure in emergencies. Controlled by means of molded rubber valves actuated through pedal.

THE B-K Vacuum Booster Brake is manufactured by the Bragg-Kliesrath Corp. of Long Island City, N. Y., of which Caleb Bragg and Victor Kliesrath, both well known in the automotive industry, are the founders. The development is in line with the requirement of reducing the physical effort needed to effectively apply four-wheel brakes on heavy touring cars as well as the brakes on the still heavier motor buses and trucks. The booster brake is made in different sizes to meet the requirements of all types of vehicle.

The power utilized is the vacuum which exists in the inlet manifold of the motor whenever the throttle is closed, this vacuum being made to act on a piston in a cylinder by means of the conventional brake pedal or hand lever. The booster cylinder, which is fastened to the chassis, is interposed in the brake rod between the brake pedal and the brake equalizer or cross shaft. The piston rod is connected to the brake linkage, and the hollow valve rod is connected to the brake pedal and also with the inlet manifold through a pipe containing a check valve.

Double-Acting Piston

The booster cylinder is double-ended and contains a double-acting piston and a double piston cup of molded rubber, sealing against pressure in both directions. A hollow piston rod extends through both heads of the cylinder. Within the hub of the piston there are two valve chambers, each having two valve seats. Four conical valves of molded rubber are mounted on the hollow valve operating rod. These valves are capable of sliding on the

valve rod, and they are held in two pairs, with a spring between each pair, by four collars which engage their respective valves, moving them from their seats or permitting the seats to move from the valves. Whenever the valves have been fully opened, the hollow valve actuating rod engages the piston rod in such a manner that any further motion of the brake pedal will move the piston rod in either direction, without any strain on the valve mechanism.

In connection with the use of the intake vacuum for the purpose of operating the booster brake cylinder, it must be borne in mind that this vacuum is greatest (about 20 inches of mercury column, or about 10 pounds per square inch) when the throttle is closed, which is its normal position when the brakes are to be applied. However, by means of a check valve, the brake cylinder is kept under vacuum on both sides of the piston at all times, and when it is desired to brake, one end of the cylinder is placed in communication with the atmosphere, while the other end remains in communication with the intake manifold.

In the longitudinal section reproduced herewith, 1 and 4 are the valves which control communication between the ends of the cylinder and the atmosphere, while 2 and 3 are the valves which control communication between the ends of the cylinder and suction in the inlet manifold. It will be seen that the suction chamber, located between valves 2 and 3, is in communication with the inlet manifold through the hollow valve operating rod and that atmospheric air can pass between the hollow piston rod and the hollow valve rod to the atmospheric valves 1 and 4.

Valve collars C_1 , C_2 , C_3 and C_4 , which control the relation between the position of the valve rod and the positions of the valves, are so located on the rod that valves Nos. 2 and 3, which control the admission of the vacuum to the cylinder ends, can never be closed at the same time, nor can either of the atmospheric valves 1 and 4 be opened until the adjacent vacuum valve has been closed, and vice versa.

By means of this valve arrangement it is possible to keep the whole of the brake cylinder under vacuum at all times except when the brakes are being applied. To apply the brakes, atmospheric air is admitted to the rear end of the cylinder, the excess pressure of this air above that of the partial vacuum in the other end moving the piston.

When it is desired to release the brakes, the air in the rear end of the cylinder is exhausted, thereby placing both ends of the cylinder again under vacuum and permitting the brakes to release themselves; or it is possible to admit atmospheric air to the forward and the vacuum to the rear end of the cylinder to insure a quick release of the brakes under the power of the piston.

Piston in "Off" Position

In the longitudinal section the piston is shown in the normal or "off" position, with both of the vacuum valves (2 and 3) open, so that both ends of the cylinder are in a state of equal rarification due to the suction of the engine. To apply the brakes the operator moves the valve operating rod to the left, with the result that Collar C_2 opens valve 2 farther, while collar C_3 permits valve 3 to close before collar C_4 moves valve 4 from its seat. As there is a partial vacuum in the forward end of the cylinder, the pressure of the atmosphere admitted through valve 4 forces the piston forward in the cylinder and thereby applies the brakes. Emphasis should be laid on the fact that, since the forward end of the cylinder, which is the one communicating with the inlet manifold, was under vacuum before the brake was applied, there is no appreciable flow of air from the cylinder into the manifold as an accompaniment of brake application, and consequently no danger of stalling the engine.

As the brake is being applied by the pressure of the air against the rear face of the brake piston, whenever the operator stops forward motion of the brake pedal, the valve rod will also come to a stop and a slight continued movement of the piston then will bring the seat of valve 4 up against that valve, thereby shutting off communication of the rear end of the cylinder with the atmosphere. Any further movement of the piston would open suction valve 3, which would withdraw any excess air.

When the operator gradually removes the pressure from the pedal, the retracting spring forces the valve rod to the rear and valve 3 then opens and places the rear end of the brake cylinder in communication with the inlet manifold. This equalizes the pressure on opposite sides of the piston and the brakes will release themselves without making it necessary to admit atmospheric air to the forward end of the cylinder and any subsequent application may be made in the manner of the initial application just described.

Positive Release Is Assured

If the operator takes his foot off the pedal, both the vacuum valve 3 and the atmospheric valve 1 will open, the latter then admitting atmospheric air to the forward end of the brake cylinder, thereby positively releasing the brake.

It will be noted that air is admitted to the intake manifold only upon the release of the brakes, and therefore the passage of this air into the intake manifold may be restricted, where necessary, to prevent the motor from stalling, without interfering with the application of the brakes, which would be delayed were it necessary to exhaust the

air from the cylinder with each application of the brakes.

With this type of brake, the pressure applied to the brake bands or shoes depends, of course, on the size of the brake cylinder used. The Bragg-Kliersrath Corporation recommends the use of moderate sized cylinders which will not lock the wheels under ordinary conditions, as the operator may at all times add his physical strength to the work of the booster cylinder for emergency stops.

The rate at which the brakes are applied is controlled by the movement of the pedal. For a normal application the valves need only be "cracked." More rapid application requires more foot pressure to fully open the valves, as the tension of the valve springs builds up very quickly. This varying tension of the valve springs gives a "live" feeling to the pedal and prevents it from "running away" from the foot.

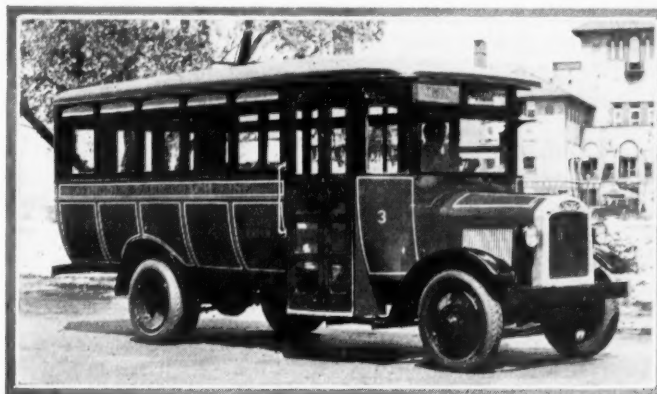
The lost motion, approximately $\frac{1}{8}$ in., required for fully open valves from the neutral position cannot be detected. The valves, however, open more and more as the speed of the position, under the increasing load of applying the brakes, falls behind that of the operator's foot. When the maximum braking load is carried by the piston, the valves are fully open, and the valve operating rod then engages the piston, permitting the operator to apply his physical force in addition to that exerted by the piston.

In the event of a partial or total failure of the source of power, such as a stalled engine or a broken pipe, the operator may apply the brakes by physical force, the booster brake adding only slightly to the frictional resistance which must be overcome as the valves are always in the correct position to properly vent the cylinder.

Fisher Bus Introduced

FOLLOWING the introduction of the "Fisher Fast Freight" chassis eight months ago, The Standard Motor Truck Co., Detroit, now announces a Fisher Bus having a 21-passenger pay-as-you-enter type body. Except for the mounting of 30 by 5 dual tires in place of 32 by 6 tires at the rear, the chassis is identical with the Fast Freight chassis and sells at the same price, \$1,295.

In designing the original Fisher model, it was planned to have the chassis adaptable to either bus work or quick delivery service, consequently the latest bus edition embodies all features desired in modern bus operation, having low center of gravity, long wheelbase, short turning



New 21-passenger Fisher bus

radius, wide track and low frame height. The 20-in. wheels, which are interchangeable, provide a road clearance of $9\frac{1}{2}$ inches under both front and rear axles. The four cylinder 50 hp. Continental engine allows a maximum road speed of 45 m.p.h.

Other styles of bodies, having either side or cross seats or a combination of both, will be available.

Two Oil-Pull Tractors and a Monarch Pass Nebraska Tests

Farm machines awarded certificates Nos. 111, 112 and 113 in official trials at State University. Pickering Model 1213 Governor is also tested.

THREE more farm tractors have passed through the official tests at Nebraska State University and have been awarded test certificates Nos. 111, 112 and 113. Two of these are Oil-Pull tractors manufactured by the Advance-Rumely Thresher Co., Inc., of La Porte, Ind., and the third is a Monarch Model C manufactured by Monarch Tractors, Inc., Watertown, Wis.

Oil-Pull Model M (Certificate No. 111) has a two-cylinder, horizontal, valve-in-head engine of 6 13/16 in. bore and 8 1/4 in. stroke. The engine has removable cylinder sleeves and is mounted with the crankshaft crosswise of the tractor frame. The rating is 20-35 hp. and the rated speed 640 r.p.m. Cooling is by oil; the governor is of the fly-ball type, of the company's own design, a Donaldson Simplex oiled fiber type air cleaner was fitted and lubrication was by the Manzel oiler. Ignition was by American Bosch DU4/2 Ed22 magneto and carburetion by a Secor-Higgins fuel valve.

Chassis features include four wheels, of which two are drivers; a disk clutch and inclosed gears. Three forward changes of speed are provided, as follows: First, 2 m.p.h.; second, 2.5 m.p.h.; third, 3 m.p.h. The total weight of the tractor with operator was 8750 lb.

Kerosene Used as Fuel

In the rated load test the engine developed 35.39 hp. at 642 r.p.m. The fuel used was kerosene and 11.22 hp.-hr. were developed per gallon. Water is injected with the fuel in this engine, the rate of consumption being 2.79 gal. per hour, (88.5 per cent of the fuel consumption). In the maximum load test the engine developed 43.07 hp. at 642 r.p.m., 8.43 hp. hr. being developed per gallon of kerosene. In this test the rate of water feed to the cylinders was 5.09 gal. per hour, or practically the same as the fuel consumption. In the half load test the engine developed 18.01 hp. at 650 r.p.m. with a fuel economy of 8.98 hp. hr. per gallon of kerosene.

In the rated load drawbar test, which extended over 10 hr. and was run in second gear, the tractor developed a drawbar pull of 3017 lb. at a speed of 2.63 m.p.h., corresponding to a drawbar horsepower of 21.13. The kerosene consumption was at the rate of 1 gal. per 5.89 drawbar hp. hr. Water consumption was at the rate of 3.3 gal. per hour. In the maximum load drawbar tests the tractor developed a drawbar pull of 4850 lb. at 2.13 m.p.h. (27.54 hp.) in low gear, 3705 lb. drawbar pull at 2.65 m.p.h. (26.2 hp.) in second gear and 2720 lb. drawbar pull at 3.32 m.p.h. (24.03 hp.) in high gear.

During the complete test, consisting of about 41 hours' running, the following lubricant was consumed: Seven gal. of Mobiloil B, of which 1 1/2 gal. was put into the crankcase and 5 1/2 gal. into the lubricator; also 2 lb. of cup grease for other lubrication.

No adjustments or repairs were necessary and the tractor was in good running order at the end of the test.

Official test No. 112 relates to Oil-Pull tractor Model L, of 15-25 hp. rating. This has a two-cylinder, horizontal, valve-in-head engine of 5 13/16 in. bore by 7 in. stroke, the rated speed being 755 r.p.m. The cylinder sleeves are removable and the engine is mounted with the crankshaft crosswise of the frame. Equipment is the same as on the Model M. The total weight of the tractor with operator was 6050 lb.

25.19 Hp. at 754 R.P.M.

In the rated load test the engine developed 25.19 hp. at 754 r.p.m., the kerosene consumption being at the rate of 1 gal. per 10.88 hp. hr. The water consumption of the cylinders was at the rate of 3.765 gal. per hour (63 per cent more than the fuel consumption). In the maximum load test the engine developed 30.52 hp. at 754 r.p.m., the fuel consumption being at the rate of 1 gal. per 8.42 hp. hr. The water consumption in this test was at the rate of 4.9 gal. per hour, as compared with a fuel consumption of 3.625 gal. per hour. In the half load test the engine developed 12.98 hp. at 772 r.p.m. with a fuel consumption of 1 gal. per 10 hp. hr. and a water consumption of 0.47 gal. per hour, as compared with a fuel consumption of 1.298 gal. per hour.

In the rated load drawbar test the tractor developed a drawbar pull of 2315 lb. at 2.59 m.p.h. (16.01 drawbar hp.) in second gear, the fuel consumption being at the rate of 1 gal. per 6.2 hp. hr. In the maximum load tests the tractor developed 3327 lb. drawbar pull at 2.08 m.p.h. (18.48 drawbar hp.) in low gear, 2816 lb. drawbar pull at 2.58 m.p.h. (19.34 drawbar hp.) in second gear and 2228 lb. drawbar pull at 3.15 m.p.h. (18.74 drawbar hp.) in high gear.

During the complete test, consisting of about 40 hours' running, the following lubricant was used: For the engine, 8 3/4 gal. of Mobiloil B, of which 1 gal. was put into the crankcase and 7 1/4 gal. into the lubricator; also 2 lb. of cup grease for other lubrication.

Condition Good After Test

No adjustments or repairs were necessary during the test, except that after the belt tests the first ring on the left cylinder was found to be stuck in its groove, which was corrected by cleaning. At the end of the tests the tractor was in good running order. No exception is taken to the advertising literature submitted with the two Rumely tractors.

The Monarch Model C tractor, for which certificate No. 113 was issued, is equipped with a four-cylinder, vertical Beaver engine mounted with its crankshaft lengthwise. The bore is 4 3/4 in. and the stroke 6 in., and the tractor is rated at 25-35 hp. at 1200 r.p.m. of the engine. The engine has Dow metal pistons and duralumin connecting rods. A Pharo oil-type governor and a Bennet oil filter and centrifugal type air cleaner were fitted. Ignition

was by a Robert Bosch DU4 magneto and the carburetor was a Stromberg M4.

The tractor is of the tracklayer type with two tracks and open chain drive. The advertised speeds of the tractor are 1.75, 2.50 and 3.25 m.p.h. The total weight of the tractor with operator was 10,630 lb.

In the rated load test the engine developed 35.68 hp. at 1203 r.p.m. with a gasoline consumption of 1 gal. per 8.83 hp. hr. In the maximum load test the engine developed 43.67 hp. at 1200 r.p.m. with a gasoline consumption of 1 gal. per 7.62 hp. hr. In the half load test the engine developed 18.17 hp. at 1214 r.p.m. with a gasoline consumption of 1 gal. per 6.24 hp. hr. The rate of loss of water from the cooling system was 0.193 gal. per hour in the rated load test; none in the other two tests.

Load Drawbar Test

In the rated load drawbar test the tractor developed a drawbar pull of 3553 lb. at 2.75 m.p.h. (26.07 drawbar hp.) in second gear, the fuel consumption being at the rate of 1 gal. per 5.47 drawbar hp. hr. This test was of 10 hours' duration. In the maximum load tests the tractor developed a drawbar pull of 6680 lb. at 2.11 m.p.h. (37.59 drawbar hp.) in low gear, a drawbar pull of 5182 lb. at 2.72 m.p.h. (37.58 drawbar hp.) in intermediate gear and a drawbar pull of 2593 lb. at 4.59 m.p.h. (31.77 drawbar hp.) in high gear.

During the complete test, consisting of about 34 hours' running, the following lubricant was used: For the engine, 3½ gal. of Mobiloil BB, of which 3 gal. was required to fill the crankcase, and ½ gal. was added; also 2 gal. of

600W and 2 lb. of cup grease for other lubrication.

After the rated load belt test the fan belt was shortened. No other adjustments or repairs were necessary during the test and the engine was in good running order at the end of the test. No exception is taken to the advertising literature submitted with the tractor.

Pickering Governor Test

An official test has been made also of a Pickering Model 1213 governor with 6½ in. lever arm for Fordson tractors, this governor being the product of the Pickering Governor Co. of Portland, Conn.

The Fordson tractor engine on which the tests were made developed a maximum power of 18.37 hp. at 1005 r.p.m. without the governor and with the governor fitted and all other adjustments the same the maximum power was 18.31 hp. With the same adjustment the engine governed as follows under decrease in load: 16.17 hp., 1101 r.p.m.; 12.48 hp., 1142 r.p.m.; 8.51 hp., 1181 r.p.m.; 4.53 hp., 1205 r.p.m.; 1.15 hp., 1218 r.p.m.

When the governor was adjusted for 1050 r.p.m. at no load the engine ran at 1002 r.p.m. under 10.76 hp., at 1002 r.p.m. under 14.87 hp. and at 1001 r.p.m. under 17.02 hp.

When the governor was adjusted for the rated speed with 80 per cent. of the maximum horsepower and carburetor and ignition were adjusted for best economy, the engine ran at 1010 r.p.m. under 14.81 hp., 1037 r.p.m. under 12.32 hp., 1060 r.p.m. under 9.29 hp., 1083 r.p.m. under 6.45 hp., 1099 r.p.m. under 3.44 hp. and 1114 r.p.m. under 1.05 hp.

Russian Firm Designs Crude Oil Farm Tractor

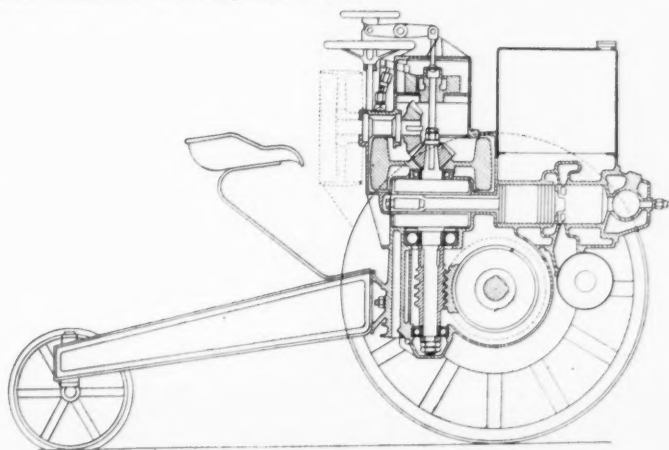
AN exceedingly simple design of farm tractor has been put in production by Kotliarenko Brothers, a Russian firm. It is a three-wheel type, all but 4 per cent of the weight being normally supported by the two front driving wheels. The engine is of the two-stroke, single cylinder, crude oil, hot bulb type and is mounted on its side, as shown in the accompanying sectional view. The crankshaft is mounted in ball bearings which take both the radial load and the thrust, and the lower end of the shaft carries a worm which meshes with a worm wheel on the solid driving axle. No differential is used, but each driving wheel is secured to the driving axle by a friction clutch, and in making a turn the clutch on the off side is released, which, apparently, can be done only from the ground and while the tractor is at a standstill.

From the upper end of the crankshaft a power pulley is driven through a pair of bevel gears. Cooling is by the so-called hopper or evaporation system. The tractor is controlled by means of two co-axial hand wheels, one above the other, of which the upper one serves to vary the engine speed and the lower one to effect the steering.

This tractor is made in two sizes of which the smaller is fitted with an engine developing (according to the makers) 7 hp. at 800 r.p.m. With the conventional wheels for agricultural purposes the tractor weighs 1120 lb. and it is capable of drawing a single bottom plow of 14 in. width and 6 in. depth. By providing the wheels with a crown of wooden blocks surrounded by a steel tire the tractor can

be adapted for road haulage purposes. Its speed on the road can be varied between about 1 and 3 m.p.h. by merely throttling the engine.

Another tractor having a single cylinder horizontal hot bulb engine has been placed in production by the Lanz firm of Mannheim, Germany, which has built tractors for many years. This, we understand, is used to a considerable extent as a road haulage tractor and is equipped with rubber tires all around. The drive is more conventional than on the Russian tractor, however.



Sectional view of Russian farm tractor Motor-Trud



Winning Lorraine-Dietrich with fabric leather body in Rudge-Whitworth 24-hour road race for stock cars at Le Mans. At left—Beetle-back 2-seater Chenard-Walcker cars with rotary exhaust valve at bottom of stroke

Lorraine-Dietrich Wins Stock Car Road Race at Le Mans

Covers 1388.1 miles at average of 57.83 m.p.h. in 24-hour Rudge-Whitworth cup contest. Only 20 out of 49 finish. Chrysler only American car entered.

By W. F. Bradley

A DISTANCE of 1388.1 miles was covered by a six-cylinder Lorraine-Dietrich, driven by De Courcelles and Rossignol, at an average of 57.83 miles per hour, in the annual twenty-four hour stock car race for the Rudge-Whitworth Cup at Le Mans, France.

The winning car had a piston displacement of 212 cubic inches.

Second place was taken by a 179 cubic inch Sunbeam, driven by Jean Chassagne and Davis, with 1343.3 miles, and third place was won by a Lorraine-Dietrich with 1335.6 miles.

Out of the 49 starters, 20 ran for the full twenty-four hours, but of these four failed to go the minimum distance required according to their piston displacement in order to qualify for next year's final. Among these four was a Chrysler Six, driven by Stoffel, the Paris demonstrator, which got seventh place with 1262.5 miles to its credit.

Of International Importance

With French, Italian, English and American cars entered, the race assumed international importance and attracted considerable public interest. Only one man could work on the car at a time; ballast equivalent to the full load of passengers had to be carried, the first 125 miles had to be covered with hoods up, and gas, oil and water could only be taken aboard at intervals of 125 miles.

Keenest competition lay between the 170 cu. in. Sunbeams and Bentleys, the 212 cu. in. Lorraine-Dietrich and the straight-eight 240 cu. in. Chenard Walckers.

The Bentleys had calculated their gas consumption without taking into consideration the head resistance with hoods up, and one of the cars was stopped with an empty tank when it had 10 miles to go and was in second place. The second car, driven by John F. Duff, last year's

winner, was put out when the carburetor casting broke. The two Chenard Walckers had leaky water outlet hose and were both eliminated. The Segrave-Duller Sunbeam developed clutch trouble after leading for 130 miles, and the race was finally fought out between the Chassagne-Davis Sunbeam and the Lorraine-Dietrichs.

With the exception of the Chrysler, all the engines had overhead valves, 75 per cent of these being with camshaft in the base chamber and push rod operation and 25 per cent with overhead camshaft. Dry sump lubrication was used on the two Sunbeams and on the straight eight Chenard Walckers; all the others had oil in the base chambers with big auxiliary tanks from which the supply could be replenished.

The six-cylinder 91 inch Corre La Licorne has a device patented by Engineer Cauzan to prevent the oil piling up in the forward cylinders under rapid negative acceleration. The oil reservoir was completely isolated from the crankcase, except for a return port at the forward end. When the oil piled up in front it automatically closed a valve in this port, thus preventing the lubricant running away from the pump and flooding the forward cylinders.

Probably the most efficient engines in the race were two Chenard Walckers of 67 cubic inch piston displacement, designed by Engineer Touté. With a two-seater body these cars covered respectively 1169.6 and 1126.7 miles in the twenty-four hours. The latter car lost about an hour by running off the road in the early morning.

In addition to two vertical valves in the head, operated by pushrods and overhead rockers, the small Chenard Walckers had an auxiliary rotary exhaust valve at the bottom of the stroke, running at one-quarter engine speed. The greater portion of the spent gases being discharged through the auxiliary valve, the exhaust valve in the head



A section of the course over which the Rudge-Whitworth race was run at Le Mans. The Sunbeam leading, followed by the Bignan

was reduced in size and the intake made of exceptional diameter. Patents cover this combination of an auxiliary exhaust valve with normal overhead valves. Weighing 1700 pounds with the useful load required under the rules, the little Chenard Walckers had a maximum speed of 88 miles an hour on the level, and in the race they proved themselves equal to the fastest of the 91-inch cars.

A special frame was used with a pronounced kick up at the front on which the four cylinder engine was mounted. The drive shaft and rear axle were slightly above the frame members and the top of the driver's seat

was on the same level as the drive shaft. A duralumin beetle-back type of body was used.

Fabric leather bodies were employed on practically all the machines with the exception of the English. The Chrysler had an all-white Zapon body built on wood skeleton frame. All the others had fabric leather on plywood or wood skeleton foundation. These fabric leather bodies stood up well and were in excellent condition at the finish, notwithstanding that two-thirds of the course, having a sandy foundation, went to pieces. Flying stones put many cars out of the race by puncturing gas tanks and radiators, but the fabric leather suffered little damage.

Front wheel brakes were used on all but three cars, 82 per cent of them being Perrot type. The Chenard Walckers and Bignans ran with transmission and front wheel brakes only, the rear axle having no drums. The 10 miles course, comprising one hairpin, two right angle and several S bends, was severe on brakes, but the only trouble which developed was axle attachment to the springs.

Distances Covered in Rudge-Whitworth Road Race

CAR	DRIVERS	MILES
1. Lorraine-Dietrich, 212 cu. in., De Courcelles and Rossignol		1338.1
2. Sunbeam, 179 cu. in., Chassagne and Davis		1343.2
3. Lorraine-Dietrich, 212 cu. in., Stalter & Brisson		1335.6
4. O. M., 122 cu. in., T. and M. Danielli		1292.7
5. O. M., 122 cu. in., Foresti and Vassiaux		1292.7
6. Ariès, 180 cu. in., Wagner Flohot		1277.2
7. Chrysler, 202 cu. in., Stoffel and Desvaux		1262.5*
8. Rolland-Pilain, 122 cu. in., Sire and De Marguenat		1255.3
9. Diatto, 180 cu. in., Rubietti and Vesprini		1090.9*
10. La Licorne, 91 cu. in., Ballart and Dautrebande		1185.6
11. La Licorne, 91 cu. in., W. and R. Lestienne		1173.8
12. Chenard-Walcker, 67 cu. in., Glaszman and Hann de Zuniga		1169.6
13. Diatto, 122 cu. in., Garcia and Botta		1169.1
14. Bignan, 122 cu. in., Springuel and Clauze		1166.8
15. Chenard-Walcker, 67 cu. in., Senechal and Le-coquency		1126.7
16. Ravel, 152 cu. in., Van den Bosch and Senet		1118.2*
17. E. H. P., 91 cu. in., D'Aulan and Dely		1110.5
18. G. M., 91 cu. in., Drance and Michelot		1081.9
19. Rolland-Pilain, 122 cu. in., Delalande and Chalamel		1064.6*
20. Sara, 67 cu. in., Erbe and Mottet		1006.5

*Failed to cover minimum distance; not qualified for final.

Michelin Safety Bolt Used

All the cars running on Michelin clincher bead tires made use of the Michelin continuous safety bolt. This consists of sections of duralumin safety lugs, united by tough rubber links, with the duralumin drilled and threaded at six points to receive six bolts passing through slots on the wheel rims. After the tire is inflated the bolts are screwed through a detachable steel plate the upper face of which has teeth engaging with a corresponding plate riveted to the outside of the rim, into the safety lug inside the tire. An extensible ring is thus obtained which locks the head of the tire to the wheel rim at six equally spaced joints, the effect being equal to that of a continuous safety lug inside the tire.

Brought out a year ago with only two points of attachment, the Michelin continuous safety lug at first proved itself defective, but the present model has given complete satisfaction and is claimed to be more reliable and lower in weight than a straight side rim.

As Many Biplanes as Monoplanes Fly in German "Rundflug"

Machines of many types compete in 3250-mile reliability tour.

Wright engines make good showing in Baeumer ships.

By Athel F. Denham

WHILE the German Rundflug did not, as was expected in some quarters, bring to light a great number of new types of machines or anything radically different from common practice in light plane design, it serves as a valuable indication of conditions in the aircraft industry in Germany. Unfortunately some of the new designs in airplanes which were supposed to have been entered did not appear in time to participate. Some of the machines entered, on the other hand, were actually of design which antedated the war, and were equipped with aircraft engines which also were designed before 1914. Noticeable among this class were an Albatross and an L. F. G., both of 1914 design, though of recent construction. It cannot be gainsaid, however, that even these machines put up creditable performances.

Of the new machines, two in particular attracted considerable attention. The first of these, the smallest in the competition, the Darmstadt "Mohammed," a light monoplane of low-wing construction, equipped with a Blackburn Tom-Tit engine, was the work of the students of the Darmstadt school and represented a rather creditable piece of work, covering 820 miles in the required time limit. The other, the new Junker T-29 low wing monoplane, which was shown here for the first time, was remarkable for its original aileron design.

Perhaps the most surprising thing in the whole Rundflug was that there were as many biplanes as monoplanes competing. It was generally expected with the recent development of the efficient monoplane glider in Germany that a vast majority of the planes entered would be modeled along the general lines of the glider. Evidently a great many difficulties have been encountered in converting the glider into a power-driven airplane, and the return to the biplane type while not startling is very much in evidence. This may have been due in part to the considerable number of breakages in the past few years which have occurred in the types of monoplanes derived from gliders. One company at least, the Udet, which in the past has built nothing but monoplanes, built their first biplane for the Rundflug.

Perhaps this reversion to the biplane type is partially responsible for the fact that so few advances in design are in evidence, as most of the experimentation in Germany during the past few years has been along monoplane lines. It should be noted here, however, that these re-

THE German "Rundflug," or circuit flight, took place in June. Five circuits were covered in the course and two days were allowed for each circuit.

The purpose of the flight was to demonstrate the reliability of airplane travel, and in this respect it had the same value in Germany that the approaching Reliability Tour that is being organized by various American aeronautical interests is expected to have in this country.

The principal sponsor of the Rundflug was the Aero Club of Germany.

marks apply only to the smaller German machines, such as were used in the Rundflug. In the commercial plane field the monoplane still predominates; naturally, since the Junker Company, which is the dominating influence in German aeronautics, consistently adheres to the monoplane type due to the inherent advantages it involves for all-metal construction.

Among the biplanes it was noted especially that there were no planes of

the strictly cantilever type, and the bracing used, it might be said, was of a practically prehistoric type, plain stranded cables being used for the most part. In the Heinkel machines, however, an attempt was made to reduce the drag due to the bracing by staggering the wings and using but a single set of bracing cables.

A few of the more modern ideas have, however, gotten into the German small plane field. The Heinkel machines were equipped with slotted ailerons of the Handley-Page type, and the Junker T-29 low wing monoplane was equipped with a novel type of aileron, which gave the plane a general appearance of having two tandem wing sections, the aileron forming the second wing, mounted slightly lower and in the rear of the main aerofoil. When the flap was pulled down the leading edge of the aileron was lifted somewhat and approached the trailing edge of the main wing section. The aileron hinge fittings were also provided with an adjustable device by means of which the initial width of the slot between the aerofoils could be varied.

The tail design of the German airplanes, judging from those which were entered in the Rundflug, give the general impression that they are smaller than we are accustomed to observe in this country, but they seemed to suffice, at least for the straight ahead flying during the competition.

Wing design in general did not demonstrate any radical departures. Only a few monoplanes had thick wing sections, among which of course were the Junkers, while none of the biplanes were equipped with thick wings. On the whole the tendency seemed to be toward the use of wing sections of about medium thickness. The tadpole type of section which had been subjected to a series of exhaustive tests at Goettingen a short time ago was not much in evidence.

None of the machines used in the Rundflug were of all-metal construction except the Junker monoplanes, which

followed the general Junker design of duralumin tube bracing and duralumin sheets for fuselage and wing coverings. The absence of more all-metal machines can be laid to the cost of manufacture when using metal in the construction of small airplanes as the majority of the commercial planes used in Germany are still of all-metal design. One method of using metals in the construction of airplanes appears to have gained considerable popularity in Germany, however, even for small planes, and that is the type of fuselage construction employed by Fokker. This method of construction utilizes welded steel tube members with piano-wire bracing, and its wide use seems to indicate that it can be easily applied to light-plane construction. It has the advantage of being perhaps the cheapest method of fuselage construction.

Axle-less Undercarriages

Adoption of the axle-less type of undercarriage by some of the manufacturers was evident in a few cases, but the majority of the landing gears were still of the standard type. In the axle-less type which has been adopted in Germany a bad practice seems to be involved in that the legs which are intended to absorb the shocks are carried to the wing sections. A hard landing could, it seems, do considerable damage in overstressing the wings without breaking them, so that accidents might occur on a future flight.

Of the German engines used, about 60 per cent were built by Siemens-Halske, a vast majority of all the engines being of the air-cooled type. This was probably due to the fact that the engine powers were limited to 40 and 80 hp. respectively in classes A and B, and that in class C, 120 hp. was the maximum permitted.

Of the non-German engines used in the various planes flown there were a number of Bristol "Lucifers," some Anzani's, an A. B. C. "Scorpion," a Blackburn "Tom-Tit," and two American 60 hp. Wright air-cooled radials. This type of Wright engine was designed a number of years ago by C. L. Lawrance, at that time president of the Lawrance Aircraft Co. The engine has been very popular in this country for use in smaller types of planes. It has three cylinders and is on the whole a small edition of the Wright 9 cylinder radial 200 hp. air-cooled J-type "Whirlwind" engine.

Both of the Wright engines used were in planes constructed and designed by Herr Baeumer, one being a monoplane, the other a biplane. They showed a most creditable performance throughout, the showing of the Baeumer planes deserving especial mention in view of the fact that these were the first planes of original design turned out by Herr Baeumer's youthful company. If a question of the best maintained performances during the last days of the Rundflug be put forward, the Wright engines would be well able to carry off the prize. The best times on the last two days of the flight were made by the Baeumer monoplane, which completed the fourth course of 664 miles in 8 hours 12 minutes, including three landings, more than 2 hours less than its nearest competitor, the Udet 8 equipped with the 109 hp. Bristol "Lucifer," and the last course of 647 miles in 8 hours 8 minutes, 40 minutes faster than the Udet 8.

If these factors had any bearing on the award of prizes, no doubt the Wright engined Baeumer would have received the first prize in its class. However, by the rules of the Rundflug, prizes were awarded, in case more than one plane completed the entire course without negative marks, according to the horsepower of the engine. As it happened, a Udet 10, equipped with a 58 hp. Siemens Halske engine, 2 hp. less than the Wright engine, also finished the entire course within the required time-limit

and received first prize in the Class B group (40 to 80 hp.).

That light-planes of very low horsepower have not by any means reached a satisfactory stage in Germany, was shown by the fact that in Class A, which consisted of planes powered up to 40 hp., only three planes out of the eight original starters were left at the beginning of the final course, all three being Daimler Mercedes monoplanes equipped with Daimler Mercedes 19 hp. engines. The only plane in Class A which actually completed the course was the Mercedes Daimler L-21 equipped with two Mercedes 19 hp. engines. Although this machine actually covered the entire course of 3250 miles, its mileage was reduced to 2000 miles because of changes and replacements which were made in the engine en route.

The following were the winners:

Class A, Engines up to 40 hp.

- | | |
|--|-------------|
| 1st—Mercedes-Daimler L-21. Two Mercedes 19-hp. engines | 2,000 miles |
| 2nd—Mercedes-Daimler L-20. Single Mercedes 19-hp. engine | 1,870 miles |
| 3rd—Mercedes-Daimler L-20. Single Mercedes 19-hp. engine | 1,830 miles |
| (8 starters) | |

Class B, 40 to 80 hp.

- | | |
|---|-------------|
| 1st—Udet 10, Siemens-Halske 58-hp. engine..... | 3,250 miles |
| 2nd—Baeumer, Wright 60-hp. engine..... | 3,250 miles |
| 3rd—Dietrich D. P. Villa Siemens-Halske 70-hp. engine | 3,250 miles |
| (27 starters—8 finished course) | |

Class C, 80 to 120 hp.

- | | |
|---|-------------|
| 1st—Caspar C. T. I. 80.5 Mercedes engine..... | 3,250 miles |
| 2nd—Junkers K-16, Siemens 81-hp. engine..... | 3,250 miles |
| 3rd—Junkers T-29, Junkers 82-hp. engine..... | 3,250 miles |
| (19 starters—13 finished course) | |

A METHOD for maintaining airplane engine output at high altitudes, based on the simultaneous and gradual increase of the piston displacement, the stroke and the compression ratio, has been worked out in France on a stock aircraft engine of the fixed radial type. The chief difficulty resided in the throwing out of balance of the engine by reason of the continual displacement of the center of rotation of the connecting rod assembly.

The system comprises three principal parts. The first is designed to make it possible to vary the stroke while the engine is in operation, by gradually moving the connecting rod assembly in accordance with the compression ratio desired. To this end a false crankpin with movable support is interposed between the master connecting rod and the crank arms. This false crankpin is operated by means of a novel differential mechanism.

In the engine referred to, the force required to pass from one compression to another is of the order of 10 tons. Nevertheless, operation of the irreversible mechanism is readily effected at full speed, the effort at the control hand wheel being less than 44 lb.

Finally, the most important part of the mechanism is the automatic balancing device, without which the operation of the engine would be impossible. This is based on the principle that the unbalanced forces created by the displacement of the crankpin are always rigorously compensated for and that by the very mechanism which effects the change in stroke.

The device is said to have been completely developed and the official acceptance bench tests are said to have been finished successfully. It was found possible to materially reduce the fuel consumption by increasing the compression ratio.

Some Advantages of Standard Specifications in the Purchase of Materials

By Dean Harvey

THE fundamental requirements for efficient purchasing have been stated as:

First: Specifying the right material.

Second: Buying the material desired on the best terms as to price and delivery.

Third: Insuring that the material received is as specified.

The use of complete or standard specifications will assist materially in carrying out these three requirements.

Some of the advantages to be gained by the use of standard specifications are:

1. **Simplification.**—One of the principal functions of standardization is the reduction in the number of materials used. Simplification by concentrating attention on one standard material of a kind, permits production in larger quantities at lower cost. The better quality and greater uniformity of standard materials may allow less expensive material to be used.

2. **Interpretation of Requirements.**—Purchase specifications have the important function of giving all of the interested persons the same understanding of the requirements to be met. The purchasing agent uses a specification to serve as complete information to accompany a purchase order. The producer receives sufficient information for the manufacture. The inspector uses it as a guide in his inspection to determine the properties required. The designer learns from it what properties he may expect in the material.

3. **Test Methods.**—Standard methods of sampling and testing enable both producer and consumer to test the material in the same way and obtain comparative results.

4. **Competitive Bids.**—By the use of specifications, the consumer obtains bids on the same quality of material from all producers.

5. **Deliveries.**—Better deliveries may be obtained by the consumer, as standard materials are usually more available than special products.

6. **Production.**—Production is stabilized, as there is a steadier demand for standard than for special products. Standardization also allows manufacture for stock during periods of business depression.

7. **Sales.**—Sales of materials are facilitated as established standards become widely known, and their merits are recognized.

8. **Knowledge of Materials.**—More complete and accurate information is available regarding the properties of materials bought on standard specifications.

In addition to specifying the properties of the material desired, it is often necessary to include methods of sampling to insure representative samples, and methods of testing. The specification also should give any desired instructions for packing and marking, and the procedure to be followed in connection with rejection of defective material. There should be the fewest possible restrictions consistent with obtaining the material required.

It may be of interest to review briefly the procedure followed by the Westinghouse Electric and Manufacturing Co. in preparing purchase specifications. Two classes

of specifications are used, known as complete and limited specifications. A complete specification is one in which the requirements for the material are fully given, allowing purchases to be made on the open market. A limited specification is one which gives only part of the requirements, making it necessary for the buyer to deal only with those producers who have furnished satisfactory material and understand what is needed.

There are many materials for which existing methods of test are not adequate to determine the essential characteristics. When a material that falls in this class is to be bought a small trial order is followed through the shop and the performance of the material is determined in the application for which it is intended. If satisfactory results are obtained the material is approved, and the producer is notified to furnish the same quality on future orders. A specification is prepared, including such properties and test methods as are applicable, and purchases are limited to such suppliers as have furnished satisfactory trial orders. The same general procedure is followed in preparing a complete specification as in the case of the limited specification.

Properties of Material Desired

In the preparation of specifications, the first step is to decide upon the properties of the material desired and the method of determining these properties. The specification is written and submitted for comment to the design engineer responsible for the application of the material, to the department of the shop where it will be used, and to the inspection department. It is then forwarded to the producer for his approval or criticism. The comments from these various sources are considered, the preliminary draft is modified if necessary, and the final specification is issued.

Some of the larger companies have established what is in effect a Materials Engineering Department having control of the quality of materials entering into their products. Its functions include:

1. Preparing purchase specifications and keeping them up to date.

2. Noting the performance of the materials used and modifying the requirements when necessary.

3. Gathering data regarding the various classes of materials used.

It is sometimes claimed that the use of specifications increases prices. While there may sometimes be a tendency toward higher prices, in general a quality specification, by permitting competitive bidding, tends to lower prices rather than to raise them. The cost of preparing specifications and of inspecting materials is more than offset by the savings effected by the better quality and greater uniformity of the materials, and by the more effective use made possible through greater knowledge.

While a specification alone offers the advantage of telling the producer what is desired, the omission of inspection lets down the bars to inferior products from careless or unscrupulous producers. The amount of inspection should be suited to the needs of the various materials.

*Abstract of paper presented at annual meeting of American Society for Testing Materials.